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The Journal of Abnormal Psychology and Social Psychology

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ORIGINAL ARTICLES

THE DILEMMA IN THE CONCEPTION OF INSTINCT, AS APPLIED TO HUMAN PSYCHOLOGY

BY WILLIAM ERNEST HOCKING

1. The common use of the term instinct is not embarrassed by the fact that its meaning is hybrid. It means a mode of *behavior* and it means a mode of *interest;* and for ordinary purposes the mixture of physical ingredients with mental ingredients makes no trouble and requires no explanation.

But when a technical definition is sought mixtures are no longer satisfactory; a concept must have a fixable character, not a dual personality. Yet the effort to reach a "clear and distinct idea" of instinct commonly results in a dilemma. When the definition does justice to all that instinct means in physical terms, it fails to fit what instinct means in mental terms; and vice versa. When either side is securely nailed down, the other warps up and refuses to fall into the plane. The definer is tempted to ignore one or the other aspect of the conception; but this way of escape cannot be successful in human psychology, for reasons hereafter to be stated.

2. If the meaning of a conception could be determined by its history, there would be little doubt about the definition of instinct. For the native haunts of the idea of instinct are in behavior, animal behavior. The epoch is not far past when the animals had all the instincts, and had nothing else to go by, while man had all the reason, and had no instincts to help his reason out. This is far from being the case today; but it remains true that the conception of instinct is more at home in the place of its birth than elsewhere. It is quite possible to give a definition of instinct which takes care of all the items usually dubbed instinctive in animal behavior and excludes the rest. The following composite photograph of various such definitions shows their tendency to converge:

An instinct is an innate behavior pattern, common to all members of a species or of a sex of a species, leading from a situation marked by a specific signal or 'stimulus' through a fairly regular and more or less complex series of operations to an end favorable to the survival of the individual or of the species. Its most useful marks or criteria are adaptiveness, and untaught skill in the use of specific organs.

3. If, however, we try to approach a definition of instinct from the side of our own experience, we find it awkward. Try to enumerate the items of your own stream of consciousness that you regard as instinctive, and the reason for this will become clear.

Unless we are exceptionally instructed or sophisticated individuals, we do not label our instincts by that name while we are using them. When we are angry, it seems to us the reverse of an irrational course of conduct: it seems rather the reaction of reason itself to the irrational behavior of others, — we know nothing of an 'instinct of pugnacity' in such a moment. Or if we find ourselves disinclined to take a high dive while social impulses favor the performance and reason reassures, we as a rule make no conscious avowal, even to ourselves, of an 'instinct' of fear. The grounds for action or inaction appear to us objective; we rationalize them: and in this process the instinctive factor is transmuted, or is apparent chiefly to others.

The salient mark, from our own standpoint, of those events which psychology comes to call instinctive, is simply *interest*, — positive or negative interest. Instincts stand out from the rest of our mental life chiefly because of their emotional accompaniments and a sense of power or ease that goes with the action. In the vernacular, the domain of instinct is simply the domain of the "things one *takes to* naturally," — satisfactions which life discovers and which neither offer nor need any explanation.

4. The recognition of instincts in ourselves is greatly aided by the role played by the non-rational in the *social context* of our lives. There are the common interests which obviously help us to understand one another without elaborate explanations, to work and play together, to build intricate social arrangements on safe calculations of what human beings will want and do, and to be amused at the familiar-strange ways of the whole human tribe.

It is this quasi-cynical interest (characteristic of all psychology) which a man takes first in his fellows and later in himself, that accounts for the inescapable attachment of the conception of instinct to the mind, where naturally it is a stranger.

5. In its use, in the mental field, we have a striking instance of the disposition of mature human self-consciousness to make a mythology of itself, and to fill itself full of hidden mechanisms which it conceives as springing perpetual surprises upon its unsuspecting person. Mankind dearly loves a little machine which it can substitute for itself when it tries to think about itself. And if the machine has trap doors, which conceal a subterranean chamber full of dynamos and secret springs, and guarded by a jealous, sycophantish, and otherwise stagely-villainous censor engaged in tyrannical repressions, the mythology acquires all the fascination of a detective story or a new automobile.

If consciousness is the place where appearance and reality coincide, everybody should be a natural authority upon his own states of mind. But no one who has taught any subject with a strain of psychology in it can have failed to notice the almost complete docility with which most students will accept doctrines about what they are made of, and their almost eager readiness to believe themselves full of 'complexes,' and other phantasms of the living.

Now it would be absurd to say that these mechanisms, which evidently hail from the world of physical behavior, throw no light upon our conscious selves. Consciousness has its self-luminous regions; but it is not all self-luminous: and in those regions where it admits of light being thrown upon it, nothing else promises so much light as just these curious machines. But it is necessary to be clear that all such behavioristic elements are *imported*, — not found in the natural output of introspection, — if we would see the nature of the difficulty of the conception of instinct on its mental side.

6. This difficulty will become more apparent if we consider the importance of the work which instinct, in human psychology, is called upon to do.

When we study instinct in animals, we are first attracted by the amazing tricks which lead to results so much superior to most works of conscious device. Then we learn that instinct is engaged not primarily in doing tricks, but in governing the whole normal round of animal life, its breeding, food-getting, migrating, etc., — broad categories which describe equally well the natural round of human life.

It is at this stage that we are likely to import the conception into human psychology; for instinct in man is not of the trick-working order but rather of the order of interests which govern the broad

life-cycle. And the classic list of human instincts as 'love, hunger and self-defence' expresses well the meaning of the conception at this stage.

In popular and literary use, the conception will probably adhere to this meaning. When Goethe wanted to express the quasi-cynical, Solomonian view of human life (Solomon, the first psychologist whose works have come down to us) he did so in the lines, which I will venture to render as follows:

Why all this ado under the sun, this labor and turmoil of men? —
They are striving to nourish themselves, to bring children to birth and to nourish them: —
No one achieves a jot more, torment himself as he may.

The whole sum of human biography and history is told in terms of these three great impulses or interests, and on the basis of introspection, these major interests are simply *there*. An interest explains all the actions that men carry out for its sake; it does not explain itself. And it may reasonably be held not only that an interest needs no explanation but that it is incapable of explanation. Value is the only self-explaining thing in the world: and interest is value conceived as present to a conscious and active being.

But when values are referred to instincts, the conception of instinct seems to offer some explanation of those values. It implies that our interests are *not* self-explanatory; that we are not content to take them simply as ultimate facts. And it proposes to explain them by referring them to something very different from value, namely to the behavior-machines we were speaking of. It is here that the difficulty becomes acute.

I am not referring at present to the fundamental difficulty involved in the proposal to get light on the character of an interest by conceiving it as a mode of motion. All explanation proceeds by referring a thing to something else. And it is especially evident that if instinct is to explain interest, it can do so only on condition that instinct itself is defined in non-mental terms. For if instinct were defined by its conscious aspect alone, then to say that the original interests of human life are due to instincts would be a circle: for instinct, as a mental fact, can only be defined by the facts of interest.

But the difficulty is this; that if we avoid the circle by defining interest in terms of the behavior mechanisms, there is a serious gap

between those items of conduct which can fairly be referred to the mechanisms, and that large area of conduct which is governed by the major interests of which we have been speaking.

7. In the first place, the great interest-trends of human life are highly general, and the behavior mechanisms in proportion as they are strictly conceived appear highly specific.

If you carefully limit the conception of instinct to operations which mechanical conceptions (with a reasonable margin of hope) allow you to explain, you naturally begin with reflexes, and pass on to chain-reflexes and more highly compounded forms; but you end by leaving out just those major trends which make the conception psychologically important. You provide explanations for movements of manipulation, but not for curiosity; for separate movements of grasping, masticating, swallowing, locomotion, but not for a 'food-getting instinct'; for blushing, sex-play, copulation, but not for courting, sex-love, domesticity: for grasping, reaching, pulling, but not for 'construction.'

It is natural enough for the stricter scientific conscience to seek relief from this situation by roundly denying that love, hunger, self-defence, construction, curiosity, etc., are instincts at all: asserting that the only legitimate instincts are those units of behavior for which a definite stimulus and definite response can be determined, while the more general categories are instincts only for literary men and philosophers. And this is a perfectly reasonable attitude; for, we repeat, the concept of instinct is primarily a behavior-concept; and the right to define it lies with the physiologist.

But to accept this position is to take away the conception from those uses for which it was brought into human psychology; to restrain it from offering explanation for that round of life and its major values for which it was first invoked; — in brief, to confine its use in human psychology to the comparatively trivial.

8. In the second place, the great interest-trends are doubtful in their identification and in their boundaries. They were certain to fall under scientific suspicion, if only because every writer gave a different list, and because between the lists there was enormous divergence in the number of items. If some mentioned three, others (as William James) enumerated between thirty and forty.

Is there, or is there not, an instinct of fear, or of imitation, of self-preservation, of curiosity, of constructiveness? Is there an instinct for each phrenological bump? The explanatory promise of

the conception is so alluring that writers are tempted to coin an instinct for any fairly persistent trait of mankind which they wish to signalize. There is said to be a moral instinct, an aesthetic instinct, a religious instinct, a political instinct, or even (as one writer asserts) an Anglo-American instinct for parliamentary government.

There is no wonder that the technician is deterred from launching out on seas peopled by such monsters as some of these. And yet, if all such traits are omitted, in favor of the demonstrably congenital stimulus-response arrangements, the major part of human nature remains untouched. "The theory of instinct becomes comparatively trivial when they are omitted, yet it has always been muddled when they are included." [1]

The hard alternative would seem to be that between behavioristic clarity with inadequacy, and introspective adequacy with muddle.

9. But there are at least two conceivable ways of bettering this alternative.

In spite of the disposition of the concept, when defined in mental terms, to break away from all scientific restraint and sobriety, it may still be possible to introduce usable criteria which will limit the play of pure fancy and tame the concept to scientific uses. This is the way adopted by Dr. William McDougall.

Or, we may tie to physiological clarity, and try to enlarge the mechanical resources in such wise as to cover more adequately the field of human conduct as we know it.

This second path, that of contemporary behaviorism, Dr. McDougall regards as hopeless, not alone because the major impulses are so far out of the reach of present explanatory devices, but because, in his view, physiological explanations fail to account for the very simplest types of animal behavior.

The present status of the question, then, might be stated in some such way as this: Any student of human nature today must make up his mind,

a. Whether physiology can explain *anything* in behavior;

b. Whether there is reason to hope that it may explain *everything* in behavior;

c. Whether the introspective account of instinct can be made fit for scientific use.

In following sections, I wish to discuss these issues, beginning

[1] Human Nature and its Remaking, page 66.

with an enquiry into the reasons which lead Dr. McDougall to think that the physiological route has no outlet.

II

10. Dr. McDougall finds two defects in physiological theory of behavior which are not accidental and remediable, but constitutional.

First, its inability to account for persistence of effort toward an end *with endless variability of the means* employed. A machine may be regarded as making toward an end; but it makes for that end either by a rigidly fixed course of intermediate steps, as in case of the locomotive on its track, or else, as in case of the self-steering torpedo, by a course having a very limited range of variation. The visible criterion of conscious action, according to William James, is the pursuit of ends with the choice of means; and this is a criterion of conscious action only because, as McDougall believes, such action cannot be mechanically accounted for.

Second, its inability to account for responses which are responses to *meanings*, — not to any assignable sense stimulus or group of sense stimuli. Wherever you can discover a recurrent set of sense-elements in the initial situation, you can believe in the possibility of mechanical explanation. But where, as in the case of the crying of a child, the expressive reaction may be provoked by situations of a thousand sorts from physical pain to the mere fancy of neglect or reproof, where you can safely defy any one to allege a constant sensation or group of sensations in these initial situations, in brief, where the only invariable antecedent is a 'meaning,' the very attempt at mechanical explanation becomes absurd.[2]

Let us consider these two difficulties in turn.

11. First, can there be a physiological explanation of the pursuit of ends with unlimited or very large variability in the choice of means?

It may be admitted at once that the explanation of instinctive behavior by the chain-reflex pattern has definitively broken down, for all such cases. The most obviously instinctive behavior, such as nest building in birds, is too irregular in its progress, permits too many interludes and divertissements, alarums and excursions. A chain-reflex should have an invariable order: process A should always come before process B, because its conclusion is necessary to set process B in motion. If by accident process B is set off first, it will

[2] Cf. Body and Mind, ch. xix, esp. p. 264f.

never go back to A, but will proceed mechanically to C and D. If, per contra, there appears to be a degree of liberty, so that ABC may be performed as well in the order BAC, or even CBA, the chain-reflex needs some outside assistance, such as would be supplied by a mental picture of the whole result to be achieved.

Further, any chain is likely to be interrupted or impeded; in which case, a proper chain has little power of substituting a new link for the unworkable link. If, as in most complex instinctive processes, intermediate steps may be carried out in many ways, one has to fancy the chain endowed with a supervisory official capable of perceiving the equivalence of the substituted links to the original links *for the purpose of the end in view*. Naturally, an intelligent chain can explain intelligent action; but in mechanical explanations we have always to be on guard against a generous disposition to lend some of our own mentality to the machine for the sake of helping it over the critical phases of its operation.

12. That type of mechanism, then, does certainly fail to explain instinct. And I dwell upon this point, because I believe that wherever we find vitalism today, it depends upon a criticism of physiological explanations which is in principle essentially the same.

Why, for example, does Driesch require an entelechy to understand how an embryo slashed at random can develop into a typical adult? Is it not because, being forced to work with different means, it yet arrives at the same end?

Why does Bergson, thinking of organic evolution, appeal for explanation to a vital principle? Is it not because independent series of organic forms, having different beginnings and different intermediaries, nevertheless converge to similar results? In the processes which eventuate in the eye of the pecten and the eye of the vertebrate, Bergson can only see a single experimental impulse operating with widely variant means.

In a word, in all these cases it is *guidance* that requires explanation and it is precisely guidance which mechanical agencies are judged incapable of giving.

13. But if the mechanical explanation of guidance has its difficulties, it will not do to assume that the vitalistic explanation is free from them.

Any principle of explanation which refers physical conduct to an entity of mental order seems to save the biological postulate that all organs (and hence consciousness) must be of some use, but it does so

at the expense of the postulate that all physical events have physical explanations.

If one were forced to choose in this lamentable way between postulates of equal dignity, one choice might be as defensible as the other. But it is more than doubtful whether vitalism, in sacrificing one principle, actually saves the other.

For if consciousness is to be of any use at all in carrying on life, it cannot be limited to those residues of conduct which mechanics at any time threatens to leave unexplained. Consciousness must explain all of conscious behavior or none. The only principle that accords in the least with introspection is this: that whatever my body as a whole does, *I do*, — not a fraction of it, but the whole of it. We cannot separate out the 'guidance' from the rest of behavior in that way. If I go down to breakfast, that event is not to be described as a process carried out by certain hunger-mechanisms inciting certain locomotor mechanisms, while I, the conscious self, simply steer the event at the turns of the stairs and in the unexpected encounters with other living entities. It will not do to bring in consciousness to account for *remainders*.

Putting this principle into positive form, it means that if consciousness has any explaining power at all its scope *includes that of mechanism:* whatever mechanism does consciousness may do also, — so that no extension of the field of mechanical explanation would press upon or invade the field ascribed to conscious action. And conversely, no proof that guidance, or any other feature of behavior, is incapable of mechanical explanation would serve to insert consciousness more firmly in the biological realm.

14. And I am inclined to think that the proof that "guidance cannot be explained" has not been given, and indeed cannot be given. Unless I am mistaken this alleged gap in explanation is already in a fair way to be filled.

The very effective use now being made of the conception of appetite, or appetence, as a factor in instinctive action by Professor Wallace Craig, when supplemented by the studies of my colleague Professor R. B. Perry looking toward a behavioristic view of purpose, seem to me to leave the physiological view of instinctive behavior in a hopeful condition.[3]

[3] Wallace Craig, Appetites and aversions as constituents of instincts. Biological Bulletin, February, 1918.
R. B. Perry, Purpose as tendency and adaptation. Philosophical Review, September, 1917; A behavioristic view of purpose. The Journal of Philosophy, Feb. 17, 1921.

Craig defines appetite (or as he now prefers to say, 'appetence') as a state of agitation which continues as long as a certain stimulus is absent; aversion as a state of agitation which continues as long as a certain stimulus is present. In the case of the appetite, the agitation is adapted to set in motion 'seeking behavior' which tends to lead the animal, under ordinary circumstances, to the appeted stimulus, whereupon the reaction appropriate to that stimulus follows, and the organism returns to a state of comparative repose or equilibrium. Meanwhile, the channels which that stimulus is to set into action are in a curious condition, a condition different both from activity and from inactivity, and which can best be designated, perhaps, by the word 'readiness.' It is in this 'readiness' that we may now, according to Professor Perry's analysis, find the physiological secret of 'guidance.'

15. Readiness is evidently a present condition, if it is anything at all: and yet it refers definitely to a future contingency. To be thirsty is to be at the present time in a condition such that the sight of a vessel with the proper liquid in it will set off appropriate seizing, lifting, and drinking reactions.

This present condition involves a certain muscular set as well as a certain set in the nervous tissues. Offer some one a cork ball painted like a cannon ball, and observe what is involved in his 'readiness' to lift a heavy weight. So far as the nervous condition is concerned, the readiness may be conceived to involve a lowered synaptic resistance, and an incipient innervation of a group of reflexes, of which the 'consummatory reaction' is the last in order.

This 'last in order' — in the above case, the drinking reaction — is *now* last in some spatial order, as it will be the remotest in temporal order, — much as the batter now last in a series of batters sitting in a row will be the latest to come to bat, or as the ball now in the bottom of a Roman candle will be the latest in time to emerge.

But if the readiness of this final member is the *cause* of the readiness of the preceding members of the series, there is a physiological meaning for the relation expressed by saying that these preceding members exist 'for the sake of' that final event. And this final event, or rather the readiness of its channels, may in turn be said to 'select' the activities which lead up to it.

And if one of the selected preliminary operations proves unavailable when the time comes, the same mechanism will be capable of selecting a substitute. If the readiness to drink spreads into adjoining channels until it takes the mental form of a plan for getting a drink

and then an actual beginning of operations upon the plan, the failure of any part of the plan, as through a missing cup, will simply divert into other channels the readiness which, so to speak, *radiates from the channels of the consummatory reaction.* This peculiar disturbance tends to affect in some degree all channels which in the (generalized) experience of the animal have led up to the final event; and if one of them is stopped, others become more ready, until one of them supplies the bridge between the existing situation and the appeted end.[4]

In all this, there is no pretence that the mechanism of end-seeking or of selecting is actually understood: we merely suggest that there are prospects, and that it is too early to say a priori that the phenomena of guidance can have no physiological expression.

16. The second barrier to physiological explanations of behavior is found by McDougall in the fact that many responses — and the most important ones — are responses not to sense stimuli, but to meanings. Let me recall two or three of McDougall's illustrations of this difficulty.

First, the telegram illustration. Compare two telegrams, — Our son is dead, — Your son is dead. Slight difference of sense-stimulus; enormous difference of response. The response is not to the sense-stimulus, but to its 'meaning.'

Second, curiosity in presence of the novel. Curiosity has various other possible occasions, and novelty various other possible results: but let it be admitted that novelty has a tendency in growing human organisms to excite the behavior characteristic of curiosity. The logical consequences of such an admission are highly interesting. Assume that a stimulus may be defined as a sensation or set of sensations which will set off a given reaction *each time it recurs.* That which is novel or strange is defined as that which has not previously occurred, and which, when it occurs again, will no longer be novel. If novelty, then, is a stimulus to any instinct, it is a stimulus which *negates the very definition of a stimulus* above given. The recurrence of novelty contradicts the recurrence of sensation-groups. Further, the novel is relative to the experience of the individual: that which is strange to A is not strange to B. Hence there can be no set of sense-stimuli which can be universally counted upon to arouse curiosity. Novelty is uniform only as a meaning, never as an object.

[4] This conception of multiple readiness is used to explain another type of selection by Joseph Peterson. Completeness of Response as an Explanation Principle in Learning, Psychological Review, 1916, 153–162.

Such instances (and we may recall also the crying reaction above mentioned) put beyond question the proposition that what occasions the reaction is, in a large part of behavior, no assignable set of sensations, but a meaning.[5] Indeed, the case of response to meaning is so clear, when stated, that Schneider's now somewhat ancient classification of impulses into sensation-impulses, perception-impulses, and idea-impulses, seems to have been accepted by William James without hesitation:

"To crouch from cold is a sensation-impulse; to turn and follow, if we see people running one way, is a perception impulse; to cast about for cover, if it begins to blow and rain, is an imagination impulse."[6]

17. But does the fact that idea-impulses exist prove that in such cases the event is not physiological? Not unless we commit ourselves to the view that having an idea or a meaning is a mental fact to which no event in the brain corresponds. But surely it would be at least as difficult to prove that there is no brain event corresponding to meaning as to prove that there is no brain event corresponding to guidance. Admitting to the full that "meaning is the essential link in each case between the series of physical impressions and the series of physical effects" — and I believe this to be a true and important observation — admitting that in the case of the crying reaction, "the only invariable antecedent of the expression of distress seems to be disagreeable feeling," [7] is it not contrary to all probabilities to suppose that such a meaning as a 'disagreeable feeling' is not well represented in a complex of physiological states? It is not necessary that the stimulus should be limited to congeries of sensations in order that it may be physiological. I am obliged to judge, therefore, that upon scrutiny this second barrier likewise disappears.

18. We see no reason, then, to set limits to the possible progress of physiological explanations of instinct, — always with the usual understanding that no such explanations presume to identity with the thing explained, still less to displace it. But we must here point out that when we save the day for the physiological explanation of idea-impulses, or responses to meaning, by insisting that there may be a physiological basis for meaning in some central process character-

[5] 'Meaning' is here to be understood in the sense of the general idea, not in the sense of simple reference from particular to particular, as occurs in any case of conditioned reflex or other forms of the transfer of stimulus through learning.

[6] Psychology, II, p. 385.

[7] Body and Mind, p. 266.

istically different from sensation-process, we involve the physiologist in a serious admission as to the psychological value of his explanations, and hence of his entire conception of instinct.

For the situation we have reached is this. Either the physiologist must admit that there may be centrally initiated reactions (corresponding to the responses to meaning) or he must abandon his case. But if he admits such centrally initiated responses, he admits at the same time that our knowledge of the physiology must be derived primarily from our introspective knowledge of the corresponding experience, not our knowledge of the experience from the corresponding physiology. He hands over the conception of instinct, at the point of its most important development, to the student of the mind on its own ground. Certain consequences of this admission we have to trace in our final section.

III

19. The conclusion we have so far reached may be stated summarily as follows: We can save the possibility of a physiological explanation of instinct, but at the cost of much of its usefulness.

In the phenomena of 'guidance' and 'response to meaning' there is no demonstrably impassable barrier to the physiological theory of behavior. But neither of these phenomena will be made a whit clearer by the discovery that a mechanical process can be imagined which might run along with them. Here it can hardly be said that the explanation helps to understand the event: it is rather the event that sets the pace for a limping and highly speculative power of explanation.

The possibility of extending the behavioristic picture of instinct into these regions is highly important for the general theory of the relation of body and mind: but for actual investigation, that picture is useful only where we can identify in physical terms the stimulus or initial situation and the response. Where either stimulus, or response, or final situation must be identified with hypothetical conditions of indemonstrable processes in inaccessible nervous centers, any advance of knowledge must be gained from other sources — presumably from introspection — and our conception of instinct will perforce take on a mental ingredient.

Let me now make this general conclusion more concrete by pointing out how various further facts about instinct likewise carry us

into this region of central factors. These facts concern chiefly the ways in which our instincts are connected with one another, — matters of great difficulty, but of the first importance and of endless interest. My contention will be that the empirical facts cannot be brought into their rightful order without an appeal to introspection.

20. Consider first a group of facts which we might label *the instinctive regulation of instinct.*

Our instincts do not simply 'go off' like a piece of fireworks when the fuse is lighted: they are subject to certain adjustments in their working, — adjustments which are so universal and typical that they are themselves usually regarded as instinctive, and might be called instincts of the second order, or reflexive instincts.

Play is an excellent example. Play would perhaps not exist unless there were more primitive instincts needing preliminary exercise, and showing a budding readiness before their day of maturity. Among the stimuli of play, then, we must reckon this 'readiness,' — a central condition. And all instincts which take part in play are kept under the constant control of meanings which can only be referred to central processes, — the make-believe or feigning idea, for example. In feigning, the normal stimulus of an instinct may be absent, and some substituted sense-object may assume that character, as when in bayonet practice a soldier sets up an excelsior dummy and imputes to it the character of enemy-ergo-stimulus-to-pugnacity; or the veritable stimulus may be present and the course of the reaction may be held in check by the feigning attitude. This is especially the case in the feigned hostilities of social games.

Analogous to this instinctive control of instinct in play — and often fusing with it — is control of instinct by *social dispositions.* Craig has observed a characteristic restraint of pugnacity in the domestic quarrels of pigeons:

> "The male is always restrained in his attacks upon his mate. Indeed, the male shows restraint even when quarreling with neighbors outside his own family: for if they are birds with which he is familiar, he fights them with less fury than he would show to an utter stranger. Many other examples could be given of what I must call the pigeon's sense of rights and duties.[8]

One of the most striking of these instinctive regulators of instinct, however, is *pugnacity* itself, which in the above instances was a regu-

[8] American Journal of Sociology, July, 1908, p. 98.

lated reaction, not a regulator. For as McDougall has excellently pointed out, pugnacity is excited by a hindrance to the operation of other instincts, notably of acquisition and of sex; and its function seems to be that of bringing an access of energy to their pursuit.

In discussing 'guidance' we have already noted that an impeded nervous current has resources for finding some substitute path, or even for adopting some alternative object of appetence. But pugnacious behavior is marked by the rejection of these outlets: it insists on its object and on its path, and bends its effort to the removal of the obstacle or the competitor. What could be the physiological sign for preferring the pugnacious resource to either of the others?

21. The differentia of the pugnacity-arousing situation must lie in something corresponding to an unusual mental reluctance to give up this particular object of appetence, or this path, for some other object or path, together with a recognition of possible *removableness* in the obstacle or competitor. It seems to be a function, in part, of the energy of appetence; as if the circumstance of choosing a particular object of pursuit and of beginning that pursuit had made the value of that object more imperative, sometimes carrying the appetence over a threshold beyond which the resource of substitution in case of check is no longer admissible. Beyond this threshold, the determination of energy is toward a subordinate or auxiliary appetence, that of removing the obstacle.

But the pugnacity-differentia is also a function of the presumptive removableness of the obstacle, as may be seen by noting the relation of pugnacity to two other of these instinctive regulators of instinct, — namely *fear* and *curiosity*.

The place of the instinct of fear (or of flight with emotion of fear) is a moot point among psychologists; with a strong tendency to deny the existence of a single instinct of fear, and to refer the various responses commonly included under that head to a number of different 'fears.' It must be said however that the search for a common element among these different fears has not been prosecuted with especial vigor, partly because physiology has no clear way of dealing with logically common elements, and partly because the variety of fear-provoking situations is so great, varying all the way from the specific stimuli of sudden loud noises, threatening animal expressions, etc., to certain states of imagination induced by solitude, darkness, and the uncanny generally.

But there seems to be a key to all this variety when we consider the very close physiological kinship between pugnacity and fear, which suggests that if pugnacity regulates other instincts, fear may furnish a complementary regulation. With this in mind, we discover that most of the fear-provoking situations are fairly described as *situations in which our primary instincts cannot act*, or do not fit us for acting. We have no instinctive equipment enabling us to live in water, or abysses of air: in darkness, instinctive adjustments are largely hindered, especially adjustments to sudden and stealthy movements, etc. All fear is, in this sense, a reaction to the uncanny. And fear, in this common character, is an instinctive disposition tending to remove the organism from environments in which other instincts cannot act to an environment in which they can act.

Pugnacity and fear, then, both respond to the thwarting of instinct; but pugnacity responds to a type of thwarting which is remediable (typically due to a competitor, hence to a kindred and commensurable force), while fear responds to a type of thwarting which is irremediable.

Both of these reactions in their typical forms are vigorous, and imply cognitive *certainty* regarding both the unpropitiousness of the environment and the question of its remediableness. But both, again, shade into a common region of uncertainty, in which the animal halts between fear and fight. In this case, and in the similar hesitation whether to treat the environment as propitious or as unpropitious there comes into play, in the more highly developed organisms, a further regulatory instinct, — *curiosity*.

During growth, curiosity has a slightly different regulatory role. At this time curiosity changes its direction as the major instincts develop: thus, when a boy's constructive disposition begins to appear, a curious interest in analysis, dissection, etc., accompanies it. That same condition of *incipient readiness* which stimulates play seems to stimulate also a curiosity to which play itself lends effective aid. One might conceive these incipient instincts as chronically hesitant in the human being, qualified as he is by the very non-fixity of his instincts to live in an environment which changes from generation to generation, and for the same reason required to establish his own specifications of stimulus and response: curiosity has obvious uses in the growing stage of such a creature. But it remains as an auxiliary to all instincts, especially to such pairs of instincts as branch out in

opposite directions from a common situation, as do fear and pugnacity, and so give rise to recurrent passes of uncertainty.

Thus, the primary instincts are provided with a remarkable structure of instinctive regulation, in which the stimuli for the instincts of the second order, the regulators, are *finely differentiated conditions of the central nervous current.* Some of these secondary instincts, perhaps all of them, have also specific sense-stimuli of their own; but in human psychology, their most important function is in this subtle regulation of other instincts, which we can only explain by appealing to central stimuli.

22. Consider, secondly, the relation between general instinctive tendencies and specific mechanisms. As we have just noted in the case of fear, the physiologically verifiable sequences are relatively specific, and appear as various fears rather than as a single instinct. Until it is seen that central conditions may act as stimuli, physiologists are reluctant to recognize a biological fact corresponding to the logical common character of different fears. And the same is true of all those general tendencies which we saw as making up the broad round of life.[9]

But since the conception of appetence has given us a physiological picture of the subordination of means to end, and the conception of a stimulus has widened beyond the sense-group order to include central processes, such as might correspond to highly general ideas, there can be no reason for further hesitation to recognize the broad categories as genuinely instinctive, — if there is sufficient reason *for* doing so.

That there is sufficient reason for recognizing many of these general instincts I have already indicated in my book on Human Nature and its Remaking (see esp. the tabular 'Survey' p. 56); though I found myself at that time (1918) in much doubt about several of these categories, and printed a question-mark after them. This was true particularly of two very general instincts which I then called the instinct to physical activity and to physical inactivity. These would correspond roughly to the two types of reaction, expansive and contractive, from which Schneider in his genetic speculations conceived

[9] It is to be noted that the most specific units of behavior, such as the infant's grasping reaction, are logically general in the sense that *any* object of the class defined by the stimulus-description will set them off. The difference between grasping and hunting or food-getting, between vocalization and sociability, etc., is not that the former is particular and the latter general, but that the latter (food-getting) unifies into one sequence a variety of units of behavior, subordinating these units both as means to an end and as the less general to the more general. This logical and teleological integration of behavior elements must certainly not be forthwith assumed to exist as a physiological integration.

the rest to be derived. But I was inclined to regard them as genuine biological entities rather because there appeared to be definite units of behavior belonging to each: — yawning, stretching, rubbing eyes, listening, stalking, as fragments of a process of passing from rest to action, — and corresponding postures and actions belonging to the transition from action to repose, sleep, and even death.

Since that time my attention has been called to certain studies of Szymanski[19] describing readiness, alertness, rest, sleep, etc., as variations of attention: and attention in turn as a setting of the organism in respect to the reception of stimuli. This description of attention would make it a process regulative of instinct, but not itself an instinctive process. Szymanski proceeds, however, to distinguish positive and negative attention, sleep being a negative state of attention; and to point out that in the sleeping attitude each species protects its most important sense-organ, — insects, for instance, protecting their antennæ. Adjustments of this sort appear to be as definitely instinctive as any of the more noted units of behavior and the appetence toward rest or action is certainly as definite as the appetence of hunger: I am inclined, therefore, to regard these two tendencies as instincts highly general, and also reflexive, as having functions regulative of other instincts.

And while it must be, in each case, a question of fact which of our general categories are merely logical classifications and which are actual dispositions, the case in principle for the reality of the general instincts seems to me made out.

23. But thirdly, the same conditions which lead us to recognize the integration of units of behavior under various general instincts will lead us to recognize a further integration which (I will not say unifies, but) tends to unify the entire life of instinct.

Even from the view of the most mechanical conception of instinct, the simple enumeration of instincts in a list never tells the whole truth about them. Apart from the integrations and regulatory devices above discussed, it is a commonplace that in instinctive behavior an organism typically acts as a whole; and this means, physiologically, that the highest centers at any moment active are involved in the circuit of the instinctive process. In mature animals, the processes in these centers have achieved a momentum of their

[19] Published in Pflüger's *Archiv*, 1918, under the title "Allgemeine Betrachtungen über das Verhalten der Tiere. (1) Körperstellungen als Ausdruck innerer Zustände der Tiere." Reviewed in Psychological Bulletin, June, 1920.

own, a trend of attention, so that the stimulus for any instinct has a certain resistance to overcome before it can gain right of way: the number of stimuli that secure no hearing at all is indefinitely greater than the number that gain the saddle. In the mature human being, this trend of attention has become a *dominant appetence*, exercising functions of 'selection' and 'consent' upon candidate-stimuli in much the same way as we found particular appetences exercising 'guidance.' This dominant appetence is an essential part of what is termed 'will': and conversely, wherever it is pertinent to use the term 'will,' there the instinctive behavior of the animal is subject throughout to the guidance of a dominant appetence, which resembles a *most general instinct*, — the persistent but unspecified craving, or ambition, or wish of the entire creature.

24. But what is the object of this elusive appetence or craving which strives toward a rough unity of instinct, and seems to gather definiteness and assurance with evolution and with individual growth? Can physiology give us instruction on this point?

We should be able to learn something about it from current theories of the *physiological basis of pleasure*. For quite apart from hedonistic assumptions, the connection between pleasure and successful instinct process is certainly close; and any one who would choose the term 'value' as a name for the common object of instinct on its mental side would be inclined to agree that the object of any most general instinct or appetence would be a most general value, qualitatively akin to pleasure.

Now it certainly cannot be said that there is any school-doctrine among behaviorists about the nature of pleasure. But we occasionally find it stated, and more often assumed, that a certain ease, or fluency, or facility of response is pleasurable, or is pleasure itself, — a behavioristic version of Aristotle's observation. "Pleasure," says Peterson in the monograph above referred to, "is a subjective indication that the response is along the line of least resistance." Pleasure is not an agent; it does nothing; it does not 'stamp in' the successful reaction after a series of unsuccessful trials: pleasure is simply the character or form of the successful act itself. A tendency toward the pleasurable would be a tendency toward a certain *mode of nervous process* in the centers, a particularly fluent or frictionless operation of the mechanism.

Now, there is nothing physiologically improbable in the view that nervous processes show a definite disposition to assume a specific form as the most favorable form for their action: in view of the physical

analogies of stream-flow, etc., it would be rather physically improbable that there should *not* be a disposition of that sort. It is clear, however, that the idea of a disposition which is due to the *nature of the nervous process itself*, and not to any canalizing of the path through which it must pass, threatens to provoke some radical change in our view of mental dispositions, and so of instinct. Just this is implied in the theory of pleasure here mentioned. A similar view is implied in Professor Woodworth's contention that all mechanisms have their own drive.

For while Woodworth seems to hold that the driving power lies in some peculiar concatenation of nervous elements which deserve the name of mechanisms, the real force of his argument appears to be that 'drive' is a character of the nervous excitation itself wherever found (which would certainly follow from the proposition that the nervous process is a flow of energy of some sort); and that mechanisms merely aid this excitation to take on certain auspicious forms rather than others.

This may be shown to advantage by considering the criticism which McDougall has made of Woodworth's theory in a recent issue of Mind.[11] It would follow from Woodworth's view that there could be a love of music, apart from any instinct for music, if there were mechanisms congenital or acquired favoring skill in music. McDougall is inclined to deny to the interest in music any such independent status, referring it rather to affiliations with the instinct-drives, with "ambition, vanity, the desire to excel, emulation, the desire to please parents or teachers, the desire to understand, the desire to fit themselves for a career, the desire to overcome difficulties, the vague desire to give expression to various emotions." He further points out that a talent for music is no single thing: but highly composite: "it implies superiority in such functions as tone-discrimination, appreciation of rhythm, of time, of tone-relations. . . . But can we suppose that such a function as tone-discrimination depends on a 'mechanism' that has an intrinsic drive? Do we ever find any one absorbed in the exercise of such a function for its own sake?" The questions are absolutely pertinent: the answers, I believe, can be made definite.

We certainly do find persons absorbed in such functions as tone-discrimination, for their own sake. Has McDougall forgotten those who choose to be piano-tuners? Certainly, there are few sources

[11] Vol. xxix, N. S., No. 115, pp. 278ff.

of enjoyment more general in the human family than this of making discriminations, — as also of drawing analogies, or applying general ideas and names to particular cases. But "can we suppose that such functions depend on mechanisms having intrinsic drives?" That is the damaging question for Woodworth's theory, and it is quite as damaging for McDougall's view: for it is equally hard to think that such functions and satisfactions depend on the instincts which McDougall has in mind.

Consider, for instance, that "appreciation of rhythm" which according to McDougall forms part of the talent for music. This is an appreciation, or value, so general in the human species as to lead some writers to ascribe it to a special instinct. But it is certainly not an instinct of the stimulus-response pattern; and it is not a disposition that can boast of extended animal ancestry. Studies of rhythmic behavior in animals render it doubtful whether any animal but man enjoys rhythm. The commonly observed rhythms in animal activity, as the swinging of birds on perches, the chirping of crickets, synchronous flapping of wings in flight in flocks, are more probably explained on other grounds.[11] And the presumption thus raised against the view that this interest in man can be referred to an inherited mechanism is strengthened by the fact that the interest seems rather waxing than waning in the race. But the facts fall naturally into place if we assume that the mode of central nervous action which ac ompanies the observing or executing of rhythm is *intrinsically satisfying*. If this value is to be referred to an instinct, it must be to a type of instinct whose stimulus and goal are alike central, one which would have to be described in terms of an unknown (but presumably propitious) type of nervous process.

And the same, I believe, would prove to be true of the other interests included in the 'talent for music,' as for most of the characteristic human interests. It will be found, I venture to predict, that Woodworth is right in dissociating their 'drive' from any primitive instincts, and that McDougall is equally right in his distrust of 'mechanisms' with intrinsic drives of their own. As physiological psychology reaches clearness in its accounts of the basis of valuation, it will turn its attention away from the now prevalent pictures of paths, synapses, connections, etc., toward pictures of the different forms which the nervous current is capable of assuming. The most general

[11] W. Craig, On the ability of animals to keep time with an external rhythm. Journal of Animal Behavior, Nov.-Dec., 1917.

appetence of the human being will appear as a disposition toward some special mode or form of the central flow.

25. But if this is the case, it may also be predicted that for our chief data regarding this region of instinct, and regarding the most important relations among the instincts, both we and physiological psychology itself will have to depend on introspection. Especially the great business of unifying the instincts into a more or less serviceable will requires the achievement of a dominant value-trend which we shall always understand better from the way it appears in consciousness than from the way in which physiology may explain it. The theory of values can never be made a corollary of the theory of instincts.

On the contrary: the theory of instincts cannot be finished until it becomes, in its major part, a corollary of the theory of values. In dealing with the unity and connections of instincts, the theory of instinct must change its base.

For the unity of instinct is primarily a condition of selfhood. Our chief item of certainty on this subject is that a man is not in a fully human position toward his own conduct until he is prepared to justify what he does. To justify what he does means to give a 'reason' for it: and this means, to refer it to a value. But to refer conduct to value — not alone in case of sporadic dashes for this and that good, but also in cases of conflicting impulses and of deliberate plans and policies — requires a standard of value, single, and more stable than the competing impulses themselves.

I certainly do not say that any one achieves conscious possession of a single and changeless value-standard. But I do say that human life implies growth in that direction, through the repeated process of referring particular conflicts to 'reasonable' solutions. A large part of life is left unrationalized by the avoidance of conflict and the evasion of thought: the day's program allows inconsistent goods to be pursued at different times, and the life of instinct remains pluralistic and experimental, — fortunately so. But however we evade or distrust the exercise of that most dreaded effort we call reason, there is no pair of goods which we would not submit to the comparing process if we had to. And so we live in partial pluralism, but on the assumption of a *discoverable unity* of all values, and so of all instincts. And a discoverable unity is, of course, an actual unity, though partly subconscious.

It is not however unrecognizable; and if some philosopher under-

takes to give it a name, we can reasonably discuss whether the name is a fit one: for that unity itself exists nowhere if not as a working-fact in our own active experience. If Schopenhauer calls it the will to live, or Nietzsche the will to power, or Freud one kind of libido and Jung another kind, we can estimate the justice and adequacy of those descriptions. For my own part, I believe that no description will be found wholly satisfactory. But I have elsewhere given my reasons for preferring 'the will to power' to either of the others mentioned. It is a phrase that has possibilities beyond those that Nietzsche found in it. There is a clearly ascertainable truth in the statements that in all our major instincts we show phases of a will to mastery, — in pugnacity, in curiosity, in sociability in all its forms — self-assertion, self-abasement, sex-love itself, — even in fear. And so far as life is occupied in finding out what it is that we want, that process may be described as a process of interpreting this will to power that is in us, getting rid of its crudity and barbarism, putting its competitive and physical elements into their place. This phrase tells enough truth about the nature of the unity of instinct to make it useful in the present stage of theory.

26. Admitting the 'will to power,' then, as a rough description for the common and uniting element of instinct, — always ready to yield to a better, — we may set up a working definition of instinct for human psychology in some such terms as these:

An instinct is any specific form of the will-to-power which reaches its end by the use of innate motor mechanisms, common to the species.

This is a hybrid definition. It imports elements of physiology to discriminate entities within the field of consciousness. It has that type of hybridism which distresses the radical behaviorist beyond measure. It falls fairly within the field of Perry's remark that "wherever (introspective) accounts of the motor-affective life preserve anything distinctive and peculiar, they incorporate something of the movement and action of the physical organism."[13]

But to this remark, which is intended to be critical, our first reply is a challenge to avoid hybridism and keep usefulness in your conception if you can. Our entire discussion has been an argument to the effect that this cannot be done by the behaviorist any more than by the introspectionist.

Secondly, however, the hybridism which we adopt if we begin

[13] The Journal of Philosophy, Feb. 17, 1921, p. 89.

with consciousness is only apparent, whereas the hybridism to which we are forced if we begin with physiology is both real and misleading.

In spite of all efforts at theoretical purism, the behaviorist is obliged to patch up the elements of his mechanisms with mental cohesives. Future reference, selection, memory, hesitation, effort, are never successfully reduced to — though they may be symbolized by — the characteristics of nervous interplay with the world.

But if we begin with conscious experience, the facts of physiology are not ultimately alien entities: on purely mental grounds we should require the experience of nature, and all the bodily machinery that action within a world of nature signifies. In other words, we can derive the whole set of behavior phenomena in principle from the demands of consciousness: but we cannot in turn derive the fact, nor the need, of conscious life from the principles of the bodily organism and its world.

We have, then, in our conception of instinct to make a choice between two positions, one of which is consistent in the midst of its apparent hybridism, the other of which is either in the presence of an ultimate and confessed mystery or else presents us with a helpless and unfinishable torso of a man.

THE RÔLE OF PERSONALITY DEVELOPMENT IN THE RECONSTRUCTION OF THE DELINQUENT[1]

BY EDITH R. SPAULDING, M. D.

SINCE its organization, the members of this association have been engaged in intensive and extensive studies of delinquents in accordance with the standard tests of medicine, psychology, sociology and psychiatry. Surveys have been made of large groups to discover the incidence of factors of heredity, physical conditions, intellectual capacity, environmental conditions, training, both educational and industrial, and mental status. As valuable as have been the results obtained and the information gained there has always remained an important part of the delinquent population that has not been represented in the positive findings of these surveys, and an important part of each individual that has frequently been neglected. For what do we know of those members of the prison population that are not mentally defective, have not had inherited or environmental handicaps and are not insane or psychopathic? And even though in a given case these factors are all positive there may be another element that must still be reckoned with, perhaps one that represents the results of the combination of all the other factors. This element, which has so often been neglected in the studies that have been made up to the present time, is that of personality development and especially its relation to possibilities of social reconstruction.

Personality offers such a limitless field for investigation and the approaches to the field are so many and so ill-defined that it is not surprising perhaps that investigators have not entered it with enthusiasm. It is true that medicine has already contributed much in discovering physical defects and diseases which have influenced personality in a way that has resulted in social inefficiency and anti-social behavior. In looking over the population of our penal institutions we are struck by the oddity of their appearance in general. When the peculiar physical characteristics that they exhibit are studied more closely, it will be discovered that many point to symptoms of disturbance of the glands of internal secretion. This brings us to a new field that is promising satisfying results in social reconstruction through the correction of

[1] President's Address read before the Association of Clinical Criminology at the Prison Congress held at Columbus, Ohio, October 14, 1920.

physical conditions. But when we find ourselves face to face with the facts, we realize that although a good physical condition may contribute much in the reconstruction of any individual, there is a part of him that even this does not reach. Even in the cases in which endocrinology has been of much help there is a social aspect to the case, that must be attacked from the mental rather than from the physical point of view. For it is quite as necessary to help the patient to overcome the anti-social habits that have been formed as it is to correct any disturbance that originally may have been the most important factor in their causation.

Intensive sociological investigation has unearthed unfavorable environmental conditions, that in certain cases to a marked degree and in many cases to a slight degree, have been the cause of social deviation. In considering the cases in which environmental factors have played a prominent rôle, the most important condition is again one of character formation, which has been developed as the result of injudicious training and undesirable companionship.

Psychology, through the aid of psychometric tests, has discovered the frequency of mental defect among delinquents, and has helped us in estimating the prognosis of cases studied. In the consideration of mental defect, we are now being told by experts in the field of feeble mindedness that there are a great number of "good feeble minded" in the world who are capable of filling fairly important positions in the industrial situation of the present day and of being good citizens. So that even though the factor of mental defect may make more unfavorable the prognosis of the delinquent individual, still mental defect in itself is considered of less significance than formerly as a primary cause of anti-social behavior and again the personality of the individual and its possibilities of development appear in greater relief.

Psychiatry has applied classifications of mental disease as far as it is possible to the field of delinquency. But again there is found a vast field in the realm of personality that cannot be included in any of the psychiatric classifications. It is then, it seems to us, the study of personality that offers the most productive field for scientific study at the present time. It should be approached, however, from the various vantage points of the specialties already mentioned; first, that of medicine, including special consideration of the glands of internal secretion; second, that of psychology with its psychometric tests and study of aptitudes and disabilities; third, that of psychiatry with the

aid of which we can first ascertain the mental status of the individual, and then apply to his conduct disorder the various theories which, in the last few decades, have helped us better to understand human behavior and the expression of our instinctive and emotional lives; and, fourth, the systematic study of traits of character and of social attitudes and reactions.

The study of personality per se offers unending opportunities for endeavor since there are so many possibilities of individual deviation in character development, and because each individual is the product of the thousands upon thousands of reactions that have followed each other at least since birth. Because of its general unwieldiness it has been difficult to know at which angle to begin, and its very indefiniteness has been a source of discouragement to those who strive for scientific precision in their work.

An essential part of the study of personality has seemed to us, during the years in which we have been engaged in the study of delinquency, the determination of individual traits of character. There are three different opportunities for acquiring such information in the study of the delinquent who passes through our penal institutions.

The first opportunity is during the mental test when many traits are noted more or less consciously by the examiner, but are seldom made note of or kept in the form of a permanent record. The second opportunity is when the social worker obtains from the family the past history and early development of the individual that is being studied; such as, the early traits of character that were manifested, his reactions in general to situations that arose during his childhood and, in particular, any unusual experiences that may have definitely caused inhibition or deviation in the normal emotional expression of his later life. The third opportunity is during the period of observation in the institution, where the matrons and nurses who watch the daily progress of the individual are in a position to describe his social characteristics.

A scheme for recording judgments in connection with standard psychometric scales has already been formulated by Dr. Buford Johnson and myself, but not yet published. A chart to be used by the social worker in obtaining the home history is still in embryonic form. To fill the third need a form was made out and used with the forty patients who were in our care at the Psychopathic Hospital [2] at Bedford

[2] The Psychopathic Hospital of the Laboratory of Social Hygiene in connection with the New York State Reformatory for Women at Bedford Hills, New York.

Hills. This form was based on the work done by Dr. Johnson and myself in the previous scheme and I am greatly indebted to her for permission to publish this chart before the other has appeared. In order to prove whether or not this record would yield a picture of the individual's personality the charts were given to a psychologist, who without having known any of the patients, has assembled the opinions of the five judges interrogated. Pictures have been drawn in this way of the forty patients which it has been possible to evaluate through comparison with illustrative material from their social histories and the more intimate knowledge of their mental make-up that we have at our disposal.

The personality traits that have been used have been drawn from such studies as the Hoch-Amsden Guide [3] to the Study of Personality, the study of traits made by Dr. Charles P. Davenport [4] at the Eugenics Laboratory at Cold Springs Harbor, by Dr. F. W. Wells [5] at the McLean Hospital at Waverley as well as from several other sources.

The following range of possibilities could be recorded in the estimates of the judges: — double plus, single plus, plus over minus, minus, double minus, question mark, and zero —

+ +	signifies that the characteristic is present in marked degree.
+	signifies that the trait is present to a moderate degree.
±	signifies that the trait although present is a negligible quantity.
−	signifies that the absence of the trait is somewhat noticeable.
=	signifies that its absence is very conspicuous.
?	signifies that the judge is doubtful regarding the decision.
o	signifies that the judge has no decision to record.

Variability in any given characteristic is expressed by two judgments, the one written in the upper part of the square expressing the more frequent manifestation of the trait and the one in the lower part the less frequent. For instance, a patient who is for the most part very co-operative but who at times cannot be induced to do anything suggested, would have the symbol plus plus over minus minus to express the variability.

Five judges were asked to give opinions. These were two nurses,

[3] Hoch, August and Amsden, George S.: A Guide to the Descriptive Study of the Personality, State Hospital Bulletin, Nov., 1913.

[4] Davenport, Chas. P.: Trait Book, Eugenics Record Office, Bulletin No. 6.

[5] Wells, F. L.: The Systematic Observation of the Personality in its Relation to the Hygiene of Mind. Psychological Review, Vol. xxi, No. 4, July, 1914.

two matrons and a teacher. Each characteristic was discussed with all the judges in detail so that they might agree as nearly as possible in their interpretations of the terms. It was necessary further to describe the various personalities of the judges and the work they supervised to the psychologist in order that she might evaluate the judgments made and know what work or individual called forth favorable or unfavorable reactions.

The following are the charts of two patients who were under supervision at the Hospital. Both patients were committed to the institution because of petit larceny, neither having had any sexual irregularity in their history. The intelligence of both placed them in the superior adult class according to the Terman Revision of the Binet Simon Scale. Both were exceedingly unstable and were considered two of the most difficult girls in the institution. Both are now free in the community and in spite of the fact that they were friends while in the institution, one girl has continued her anti-social conduct, stealing and being generally destructive while the second girl who was thought by most of the matrons in the institution to be of no more value socially than the first has made herself in the year that she has been out, a valuable member of society. For the first time in her life she has tried to control her temper and has gained much satisfaction from devoting herself to other people in a way that never before was possible. While one of these girls was undoubtedly more unstable than the other, the big factor was the difference in personality. It was never possible for any one to reach the first girl through any appeal, except perhaps to her vanity and that was not lasting in its effect. In the life of the second, however, an emotional experience of childhood was unearthed with the result that the world has been made a different place for her and for those in her immediate environment. A matron who recently visited her was thunderstruck when she saw what responsibility she could assume, and frankly said — "I can't get over it. You know we thought there was nothing to her at the reformatory." When the patient heard this she said, "I knew they thought that and so I lived up to their expectations and made it just as hard for them as I could — and I can be mean."

Jennie, the first patient, had none too good an heredity and also had unfortunate environmental conditions during childhood. Her mother was found asphyxiated in a hotel where she had been living with a man not her husband.

Jennie was cared for alternately by her grandmother and by

several aunts. In some of their homes she had had unfortunate training such as being taught to steal coal and ice from freight cars. In going from one home to another she had escaped all the responsibilities that the other children had been obliged to assume and grew up a headstrong, irresponsible girl who felt she must gratify every whim and who never hesitated to use violence when she was resisted.

After leaving school at the age of sixteen, Jennie went to work in a factory where an aunt had held a responsible position for many years. Resenting any supervision by a member of the family at her work, she gave up the position for less remunerative ones which she changed frequently. She was apprehended for shop-lifting and after being tried unsuccessfully on probation she was sent to a private institution where she tried to throw herself out of a window when one of the girls accused her of being immoral. She was observed at a mental hospital and was found not insane. Subsequently she was committed to Bedford where from the first she was a tremendous problem.

When she was admitted to the Psychopathic Hospital she was given an opportunity to choose the kind of occupation she preferred. Soon after entering the occupational room, she returned to her room storming against the teacher. She was then tried with the outdoor group but in half an hour had refused to co-operate in any way and had upset their equilibrium. Again she stormed into her room, talking loudly and swearing about everything and everybody. She was next tried among the workers of the hospital who were a more stable group than the patients but with the same result. This explosive behavior continued for a week, during which period every effort was made to win Jennie's confidence and her co-operation. No restrictions or punishment of any kind were imposed no matter how obstreperous she became. At the end of a week she attacked a colored girl from the rear quite viciously and without provocation while they were at breakfast. The cause was the colored girl's popularity with a white girl whom Jennie wished to pay greater homage to herself. Following this episode Jennie received her meals in her room for a week and was kept from the main group. While this helped her to get control of herself she continued to be a great problem during her entire stay at the hospital, going to pieces at the slightest provocation and lying and stealing almost incessantly.

Later when she was in the institution she was frequently in trouble as a result of her lawlessness and truly vicious behavior. Among other things, when tried out of doors with a farm group, she with the aid of

another girl nearly succeeded in throwing a matron down a spiral staircase because they were refused permission to go down into the lower part of the engine house where the men were working. The two girls after being prevented from throwing the matron down the stairs kicked her and struck her, being controlled with great difficulty by several men who came to the rescue and who also received their share of injuries from being bitten, etc.

The alienists who examined Jennie after this final episode found her not to be insane. She was returned to the court, and before long she was at large in the community, in the meantime having been instrumental in causing much havoc in the administration of the institution. Since being free she has continued her shoplifting. She has recently married, not telling her husband of her reformatory history. Finding herself to be pregnant she tells us that she swallowed some bichloride tablets. She was treated in a hospital where she was apparently very ill but because of her behavior was finally put out. She then returned to her aunt's home where she had been living since her marriage. When it was suggested by her aunt that her husband wished her to find a home for them both, she attacked the family, breaking a vase over her uncle's head, sending the children out into the street in a pouring rain storm, and proceeded to demolish the entire apartment and its furnishings in spite of the fact that the aunt was the best friend she had in the world.

Could any case present better than this the needs of the psychopathic delinquent woman and the protection from her anti-social conduct to which the public and her family are entitled?

The second patient, Martha by name, presented, while in the institution, a similar problem to that of the first. She was never to be relied on and resented restrictions of any kind. She, too, had been a spoiled child and had always carried out the whim of the moment, although she had never resorted to violence. It was evident, however, that she was suffering from great emotional repression which after some months of effort was relieved, by unearthing an emotional episode that had occurred in her childhood and around which there was centered an unnecessary feeling of guilt. There is still room for maturing, as is true of most of us, but during six months' time this patient has accomplished much in her development and she can hardly bear to think of the childish behavior that antedated her release from the institution.

In the personality chart of Jennie, variability was the most prom-

inent factor. It appeared in the differing opinions of the various judges and in the inconstancy of many of her traits as estimated by the individual judges.

Dr. Elizabeth Sullivan, to whom I am indebted for assembling the opinions of the five judges on these two patients, says in her final summary of Jennie, "This is an immature girl of good intelligence with some variability in special lines who is very unstable and has poor judgment. Her work varies much in quality and quantity of output; she frequently needs stimulation. She is over-active, quick-tempered, egotistic and egocentric and, at the same time, is easily offended and sensitive. She is generous, exceedingly jealous, very emotional and changeable, not at all conscientious and is lacking in ethical judgment. She is flippant, over-enthusiastic, defiant and aggressive. She is extremely excitable and has periods of depression.

"She lies and steals constantly; loses her temper if unable to satisfy the whim of the moment. She is resentful of authority or discipline and takes no responsibility. She blames others for what she herself is responsible and is capable of violent and assaultive behavior when angry. There seem to be few favorable traits besides good intelligence and kind heartedness and she has few serious interests on which to build."

The summary of the personality study of Martha, the patient who has since done well, is as follows: — "This girl is of the over-active type, intelligent, egocentric, introspective, seclusive, excitable and rather inclined to be depressed. She is impulsive, opinionated, sensitive and easily offended. She is a fair worker but she is so variable in effort, accuracy, attention, deliberation and skill that her work cannot be depended on for either quality or quantity of production. She reasons abstract questions rather well, but cannot apply her reasoning ability to her own conduct.

"There is suggested as a cause of her inconsistent and contradictory behavior a great fear of emotional things which points to unusual emotional repression that should be investigated. Her resentment of authority and discipline and her variability in taking responsibility imply much immaturity of development. Her sense of inferiority because of her educational and social limitations offers in part an explanation for her sensitiveness and her being easily offended. On the other hand she appears to be ambitious and is interested in typewriting which at least suggests some occupation on which to build."

Experience has shown from the cases studied that, in the recon-

struction of the mental or social life of any individual, the first step of importance is to ascertain the level of development that his character has attained at the time of the examination. Without such a knowledge of personality level and even with knowledge of factors of environmental training, physical condition, or native intellectual ability, the reconstructor is working in the dark and cannot build intelligently. Having discovered what the foundation is on which one may build, every available resource must be utilized to discover what factors, mental, emotional or physical are responsible for his retardation in character development and have prevented constructive outlets for energy in the past. The process of unearthing such factors may in itself require months of patient work, but it is only on such a foundation that a real reconstruction can be effected, and the defects in character formation be corrected.

In looking over the cases in which a successful reconstruction has taken place one factor stands out with great prominence. This is the feeling of confidence and loyalty and even affection that the patient feels toward the reconstructor, no matter whether he be psychologist, physician, reformer or merely friend. It is this factor that is of such importance in directing the energy that oftentimes has been scattered in its expression, into a single satisfying constructive channel away from the patient's self and his own egotism. While this fact has been recognized for years as a social element of great value, it is only more recently that its real significance has begun to be appreciated in what is known technically as the transference. From the psychiatric standpoint the management of the devotion that is felt for the reconstructor is one which needs extreme care and skill and the aim should always be, while accepting it temporarily as a necessary therapeutic measure, gradually to divert the same energy to more impersonal lines of emotional activity. In order to accomplish this, to help correct anti-social attitudes and to socialize the patient's egocentricity, it is necessary to find outlets for his energy that are constructive and chosen with a knowledge of his past experiences and present needs.

SUMMARY

This Association since its beginning has stood for intensive methods in the application of psychology and psychiatry to sociological problems. We should like to emphasize the importance during the next decade of special investigation of the development of personality

in the same exhaustive manner. The study itself might best be termed a social one, since it represents the expression of the instinctive life of the individual in his social relationships. But the field is not a circumscribed one and must include studies of physical make-up, taking into consideration the condition of the glands of internal secretions; it must include a study of intellectual limitations and special abilities; and any abnormalities of mental make-up that point to the presence or development of mental disease. Above all it must include the patient's traits of character, his attitude toward society in general and his own responsibilities in particular, together with an intelligent understanding of his development and retardations. When the level of development that he has reached has been ascertained he must be helped to advance to a higher level of grown-up-ness and to find the balance in his character that he has either lost or more frequently never attained.

In such an effort at reconstruction in institutional life, every social resource must be utilized that will stimulate his development. This will include any educational or industrial interests that strongly appeal to him and any social organization, whether it be a modified self-government, or honor or credit system, that will help to maintain his morale at its highest possible level. The study of personality is not unworthy of the highest standards of scientific endeavor, and it is felt that there is no field of human inquiry that will yield more remunerative results.

CHART FOR RECORDING*
TRAITS OF PERSONALITY
as observed during residence in Institution

Date — October 1, 1921
Name — Jennie Richards
Birthplace — Brooklyn, New York
Race — White
Nationality — American
Locality lived in — New York
Occupation — Factory worker

Age — 25
Civil condition — Single

Examiners	Position held
A. Miss J.	Nurse
B. Miss R.	Nurse
C. Miss T.	Matron
D. Miss F.	Matron
E. Miss H.	Matron

KEY TO CHART

++ Trait present in marked degree
+ Trait present in moderate degree
± Trait present but a negligible quantity
− Absence of trait is somewhat noticeable
= Absence of trait is very conspicuous
? Decision doubtful
O No decision
/ Variability; more frequent manifestation of trait above ... and less frequent below
* See special note

*This chart is presented tentatively; before publishing it in a permanent form, it is hoped that it may be utilized by different examiners with various groups of individuals. Suggestions from any who are interested to work with it will be welcomed.

Study of Personality

I. Intelligence as shown in	J	R	T	P	H
1 Aesthetic appreciation	+	+	++	++	++
2 Definiteness of purpose	○	+	−	⁺/₋	+
3 Ethical judgment	−	=	−	⁺	+
4 Imagination	+	++	++	+	++
5 Judgment	−	=	−	⁺/₋	−
6 Language ability	++	++	++	++	++
7 Learning ability	++	++	++	++	++
8 Memory	○	+	+	+	+
9 Mental agility	+	+	−	+	+
10 Motor coordination	+	+	⁺/₋	+	−
11 Originality	+	+	−	⁻/₊	−
12 Planfulness	⁺	±/₊	+	+	⁺/₋
13 Reasoning ability	−	⁺/₋	⁺	−	+
14 Suggestibility	+	⁺/₋	++	+	−

II. Work Record					
1 Absent-minded	○	−	−	−	−
2 Accurate	+	+	⁺/₋	⁺/₋	+
3 Automatic	−	−	+	−	−
4 Clumsy	++	−	−	−	−
5 Deliberate	−	−	−	−	⁺
6 Distractible	○	++	+	+	⁺/₋
7 Having endurance	+	−	+	−	+
8 Learning by experience	−	+	+	++	+
9 Persistent	⁺	⁺/₋	+	++	++
10 Having concentration	+	+	+	⁺	+
11 Responding to stimulation	⁺/₋	+	++	+	⁺/₋
12 Showing effort	−	±	−	⁺/₋	−
13 Skillful	+	+	⁺/₋	⁺ −	+
14 Needing stimulation	−	++	−	⁺	+
15 Variable	++	+	+	++	⁺/₋

III. Traits					
1 Adaptable	−	−	+	⁺/₋	+
2 Ambitious	−	+	+	+	+
3 Cleanly	+	++	+	++	++
4 Confidential	±	+	+	+	+
5 Consistent	−	−	−	−	−
6 Dishonest (Stealing)	+	+	±	±	±
7 Easily offended	+	++	+	++	+
8 Egocentric	+	++	+	+	++
9 Exhibitionistic	−	−	−	−	−
10 Fault-finding	+	++	+	++	+
11 Generous	+	±	+	−	−
12 Hypochondriacal	−	−	−	−	−
13 Impulsive	+	++	++	++	++
14 Introspective	−	−	−	−	−
15 Jealous	+	++	+	++	+
16 Kindhearted	+	+	+	−	+
17 Melodramatic	+	++	+	+	++
18 Neat	±	+	±	⁺/₋	−
19 Obscene	−	−	−	−	−
20 Opinionated	+	+	+	++	++
21 Optimistic	−	+	−	+	+
22 Profane	+	−	±	+	+
23 Resourceful	+	+	±	+	+
24 Seclusive	−	−	−	−	−
25 Having sense of humor	+	+	++	++	++
26 Sensitive	−	++	+	+	=
27 Self-justifying	+	++	+	++	++
28 Self-pitying	+	++	+	+	++
29 Self-sufficient	+	++	−	+	−
30 Taking responsibility	−	=	=	−	=
31 Tale bearing	+	±	+	+	±
32 Unreliable	=	=	=	=	=
33 Untruthful	⁺/₋	++	++	++	++
34 Vain	+	++	++	++	+

Traits (Continued)	J	R	T	P	H
35 Overactive	++	+	⁺/₋	++	++
36 Underactive	−	?	−	−	−
37 Irregularity	+	?	−	−	+
38 Timid	−	=	+	−	−
39 Daring	+	++	−	+	+
40 Taciturn	+	−	−	−	−
41 Loquacious	+	++	+	++	+
42 Social	+	++	+	++	++
43 Unsocial	−	=	−	=	=
44 Independent	+	++	+	++	++
45 Dependent					

IV. Type					
1 Childish	+	++	+	++	++
2 Adolescent	−	−	−	−	−
3 Adult	−	−	−	−	−
4 Follower	−	+	−	⁺/₋	+
5 Leader	+	−	+	+	−

V. Attitude					
1 Changeable	+	++	⁺/₋	+	++
2 Conscientious	=	=	−	⁺/₋	−
3 Cooperative	−	⁺/₋	+	+	+
4 Easily discouraged	+	−	+	+	++
5 Responsive	−	⁺/₋	+	+	+
6 Self-assertive	+	++	−	+	++
7 Self-depreciative	−	−	−	−	⁺/₋
8 Showing interest in					
a. Emotional things	++	+	++	++	+
b. Intellectual things	+	+	−	+	+
c. Mechanical things	+	+	+	−	−
9 Suspicious	+	−	+	+	++

VI. Manner					
1 Affected	+	++	−	+	+
2 Aggressive	+	++	+	++	+
3 Apathetic	−	±	−	−	−
4 Assaultive	+	++	+	++	+
5 Boastful	+	+	±	+	+
6 Bodily attitude					
a. Awkward	−	−	−	−	−
b. Graceful	+	+	+	+	+
c. Dignified	−	⁺/₋	+	⁺/₋	+
d. Showing abandon	−	+	−	+	⁺/₋
7 Combative	+	++	+	++	++
8 Defiant	++	⁺/₋	+	⁺/₋	++
9 Demonstrative	−	−	−	++	++
10 Enthusiastic	++	⁺/₋	+	⁺/₋	+
11 Flippant	+	++	−	+	+
12 Forceful	+	++	+	+	+
13 Frank	−	−	+	⁻/₊	−
14 Having mannerisms	−	+	−	+	+
15 Ingratiating	+	⁺/₋	−	⁺/₋	−
16 Irritable	+	=	+	+	+
17 Loud voiced	+	++	++	+	++
18 Patient	−	−	−	=	−
19 Petulant	++	+	++	+	++
20 Pleasant	⁺/₋	⁺/₋	+	⁻/₊	+
21 Having poise	−	±	−	=	−
22 Sarcastic	−	++	−	+	++
23 Self-conscious	+	=	−	⁺/₋	±
24 Self-controlled	−	=	−	⁺/₋	−
25 Serious	+	−	−	−	−
26 Soft-voiced	−	=	−	−	−
27 Sullen	+	+	−	⁺/₋	⁺/₋
28 Violent	+	++	+	+	++

VII. Emotional Tone	J	R	T	F	H	VIII Stream of Talk	J	R	T	F	H
1 Cheerful	+	+/-	+/-	±	+	1 Circumstantial	+	+	+	-	++
2 Cries often	+	-	+	±	+	2 Incessant	+	+	-	+	+
3 Depressed	+/-	+/-	+	-/+	+	3 Making repetitions	-	-	-	-	-
4 Excitable	+	++	++	++	++	4 Moderate	-	+	+	+	+
5 Laughs often	+	+	++	++	+	5 Raconteur type	+	+	+	+	+
6 Quick tempered	++	++	++	+	++	6 Rapid	++	+	+	-	-
7 Remorseful	O	-	O	-	*	7 Relevant	-	+	+	*/-	-
8 Repressed	-	-	-	-	-	8 Reticent	-	+/-	-	-	-
						9 Slow	-	-	-	-	+
						10 Tendency to unburden	+	+	+	+	+

IX. *Special Abilities.*
Knitting, embroidering, basketry, great love of play.

X. *Special causes of emotional reactions.* Being discovered in lying or stealing. Loses temper if unable to satisfy whim of moment. Inability to obtain personal adornments.

XI. *Special propensities, not already noted.*

a. *Any manifestation of sex?*
Great excitement if immorality was implied.

b. *Fears?*
None noted.

c. *Evidences of feeling of inferiority?*
None noted.

d. *Tendency to blame others for what patient herself is responsible?*
Yes. Very marked.

e. *Getting pleasure through aggressive action such as cruelty or violence?*
Not noted.

f. *Getting pleasure through submissive action such as suffering physical pain or through being forgiven?*
Not noted.

g. *Attitude toward authority and discipline?*
Very resentful.

h. *Attitude toward responsibility?*
Takes none.

XII. *Habits.*

a. *Of activity?*
Loud talking, irritability and loss of temper. Emotional explosions common with violence and assaultive behavior.

b. *Of thought?*
Continual effort to gain personal favors and material things for self.

c. *Of sex?*
None.

REMARKS

1.2 (J) *Planfulness;* some ability but wrongly applied.

1.4 (F) *Imagination* very marked; accuses people of saying things about herself and others for which there is no foundation.

11.7 (H) *Remorseful;* after committing a wrong will express sorrow for having done so, but will repeat the offense almost immediately.

1.14 (T) *Reasoning ability* poor as applied to own behavior, but fair in abstract situations.

11.10 (F) *Concentration* good when making baskets.

11.14 (F) *Stimulus necessary;* a great deal needed for things she did not want to do.

11.19 (J) *Persistent;* very, in wrong doing.

SUMMARY

I. *Intelligence* as it is shown in learning ability, imagination, and language ability is very good. Memory, mental agility and æsthetic appreciation are fair. Planfulness is on the whole fair with slight variability; definiteness of purpose, motor co-ordination and originality vary, the last named being less marked than the others. She is fairly suggestible, shows very poor judgment, especially in questions of ethics, and rather poor reasoning ability.

II. *Work.* Her power of concentration is good, especially in kinds of work which please her, but at the same time she is distractible, and the quantity and quality of the output of work varies markedly. Stimulation is necessary and her response to stimulation is usually very good with occasional exceptions. She is usually persistent, is rather skillful and fairly accurate. Is never absent-minded, clumsy or automatic. She is not at all deliberate and has no endurance. She learns fairly well by experience although there is some variation here.

III. *Traits.* She is overactive and is usually daring. She has a good sense of humor and varies in being optimistic. She is very vain, cleanly and fairly neat. She varies in adaptability, ambition, and habit of introspection. She is very loquacious, social, independent, egocentric, self-justifying and self-pitying and is also very impulsive and opinionated, at the same time varying in self-sufficiency. With these very positive traits she is rather sensitive and is extremely easily offended. She is generous, usually kindhearted, exceedingly jealous, melodramatic and fault-finding. She is neither seclusive nor introspective. She is rather resourceful but very unreliable and takes no responsibility. She is not exhibitionistic or obscene, but at times is very profane.

IV. *Type.* She is distinctly of the childish type and is capable of being both a leader and a follower.

V. *Attitude.* In attitude she is fairly responsive and co-operative, showing some variability. She shows great interest in emotional things, some interest in intellectual things and rather less in mechanical things. She is self-assertive, not at all self-depreciative, is rather suspicious and very changeable. She is easily discouraged, and not at all conscientious.

VI. *Manner.* She is pleasant with much variability and not frank, except perhaps unpleasantly so. She is usually very enthusiastic, demonstrative with some, very defiant, boastful, aggressive and combative, and even violent and assaultive. She is self-conscious, loud voiced, shows poor self-control, is rarely serious and never patient. She is, on the whole, sullen, petulant, rather affected, sarcastic, very flippant and ingratiating and is inclined to have mannerisms. She is graceful and occasionally dignified.

VII. *Emotional Tone.* She is very excitable, very quick tempered, laughs much, is very often depressed but never repressed. Is often remorseful for misdeeds but will soon repeat the same offense.

VIII. *Stream of Talk.* She is of the raconteur type and circumstantial, but usually relevant. She varies greatly in rapidity of speech and is moderately talkative. She is not reticent but has a tendency to unburden.

GENERAL SUMMARY I TO XII

This is an immature girl of good intelligence with some variability in special lines, who is very unstable and has poor judgment. Her work varies much in quality and quantity of output; she frequently needs stimulation. She is over-active, quick tempered, egotistic and egocentric, and, at the same time, is easily offended and sensitive. She is generous, exceedingly jealous, very emotional and changeable, not at all conscientious and is lacking in ethical judgment. She is flippant, over-enthusiastic, defiant and aggressive. She is extremely excitable and has periods of depression.

She lies and steals constantly; loses her temper if unable to satisfy the whim of the moment. She is resentful of authority or discipline and takes no responsibility. She blames others for what she herself is responsible and is capable of violent and assaultive behavior when angry. There seem to be few favorable traits besides good intelligence and kind heartedness and she has few serious interests on which to build.

CHART FOR RECORDING TRAITS OF PERSONALITY

as observed during residence in Institution

Date — October 1, 1920
Name — Martha Saunderson
Birthplace — Brooklyn, New York
Race — White
Nationality — American
Locality lived in — New York
Occupation — Salesgirl

Age — 25
Civil condition — Single

Examiners	Position held
A. Miss J.	Nurse
B. Miss R.	Nurse
C. Miss T.	Matron
D. Miss F.	Matron
E. Miss H.	Matron

KEY TO CHART

+-+ Trait present in marked degree
+ Trait present in moderate degree
± Trait present but a negligible quantity
− Absence of trait is somewhat noticeable
= Absence of trait is very conspicuous
? Decision doubtful
O No decision
/ Variability: more frequent manifestation of trait above line and less frequent below
* See special note

Study of Personality

I. Intelligence as shown in	J	R	T	P	H
1 Aesthetic appreciation	+	+	+	++	+
2 Definiteness of purpose	+	+	−	+/−	?
3 Ethical judgment	+	+	−	+	+
4 Imagination	?	+	+	++	+
5 Judgment	+/−	+	+	+	+
6 Language ability	++	++	+	++	+
7 Learning ability	+	++	++	++	+
8 Memory	+	+	+	++	+
9 Mental agility	++	++	+	++	+
10 Motor coordination	++	+	+	+	+/−
11 Originality	?	+	−	+	+/−
12 Planfulness	++	++	++	+	+
13 Suggestibility	−	+/−	+	+	+
14 Reasoning ability	+/−	+/−	+/−	+	•
II. Work Record					
1 Absent-minded	−	+/−	−	−	+
2 Accurate	+	+	−	+	−
3 Automatic	−	−	−	−	+
4 Clumsy	++	+	−	−	−
5 Deliberate	+	+	−	+	+
6 Distractable	−	+	+	−	+
7 Having endurance	+	+	−	−	=
8 Learning by experience	+	++	−	+	○
9 Persistent	−	+	−	−	++
10 Having concentration	+	+	−	+	+/−
11 Responding to stimulation	+	+	+	+	+/−
12 Showing effort	+	+	○	++	+
13 Skillful	+	+	−	+	+/−
14 Needing stimulation	+	+/−	++	+/−	+
15 Variable	+	+	+	+	++
III. Traits					
1 Adaptable	−	+	−	+	+
2 Ambitious	+	•	+	++	−
3 Cleanly	+	+	+	+/−	+
4 Confidential	−	+	−	+	−
5 Consistent	+	+	−	+	+/−
6 Dishonest (Stealing)	−	−	−	−	•
7 Easily offended	+	++	+	++	++
8 Egocentric	+	+	++	+	++
9 Exhibitionistic	=	=	=	−	=
10 Fault-finding	++	+	+	++	+
11 Generous	+	+	±	−	−
12 Hypochondriacal	−	−	−	−	−
13 Impulsive	+	++	++	++	+
14 Introspective	+	±	+	−	+
15 Jealous	++	+	+	±	+
16 Kindhearted	+	++	+	+	±
17 Melodramatic	+	−	±	−	+
18 Neat	+	+	+	+	−
19 Obscene	−	=	=	−	=
20 Opinionated	+	++	+	+	+
21 Optimistic	+	+/−	○	+/−	−
22 Profane	−	=	−	=	−
23 Resourceful	+	±	+	−	+
24 Seclusive	+/−	+	−	+/−	−
25 Having sense of humor	+	+	+/−	++	+
26 Sensitive	+	++	++	++	++
27 Self-justifying	−	+	−	++	++
28 Self-pitying	+	+	−	++	++
29 Self-sufficient	−	++	+	+	+
30 Taking responsibility	+/−	−	±	−	+
31 Tale bearing	−	−	−	−	+/−
32 Unreliable	+	++	+/−	+	+/−
33 Untruthful	−	•	−	−	++
34 Vain	+	±	+	−	+

Traits (continued)	J	R	T	P	H
35 Overactive	++	+/−	++	++	++
36 Underactive	=	−	−	−	−
37 Irregularity	−	?	+	?	+
38 Timid	+	+	++	•	−
39 Daring	−	−	=	?	+
40 Taciturn	−	−	+/−	=	++
41 Loquacious	+	+	+	++	−
42 Social	+	+	+/−	++	+/−
43 Unsocial	−	−	−/•	=	+/−
44 Independent	+/−	++	++	+	++
45 Dependent	+/−	−	=	−	=
IV. Type					
1 Childish	+	?	++	−	+
2 Adolescent	○	+	○	?	○
3 Adult	−	○	+/−	−	+/−
4 Follower	+	−	−	•	−
5 Leader	−	+	++	+	+/−
V. Attitude					
1 Changeable	+	+	++	+	+/−
2 Conscientious	+	+/−	+	−	−
3 Cooperative	−	++	+	+	+
4 Easily discouraged	+	−	+	++	+
5 Responsive	+	++	+	+	+
6 Self-assertive	+	++	++	+/−	+
7 Self-depreciative	−	?	−	−	−
8 Showing interest in					
a. Emotional things	+	?	++	+	++
b. Intellectual things	+	++	−	+	+
c. Mechanical things	−	+/−	?	−	−
9 Suspicious	+	−	−	+	++
VI. Manner					
1 Affected	−	+	+	+	+
2 Aggressive	−	+	−	−	+
3 Apathetic	−	−	−	−	−
4 Assaultive	−	−	−	−	−
5 Boastful	−	+	−	−	++
6 Bodily attitude					
a. Awkward	−	−	−	−	−
b. Graceful	+	+/−	+	+	+
c. Dignified	+	+/−	+	+	+
d. Showing abandon	+	+/−	−	+/−	++
7 Combative	−	+	−	−	++
8 Defiant	−	++	+	+/−	++
9 Demonstrative	−	−	−	+	±
10 Enthusiastic	+	+	−	++	++
11 Flippant	−	−	−	−	+/−
12 Forceful	+	+/−	+/−	+	+
13 Frank	+	+/−	+/−	?	−
14 Having mannerisms	−	−	−	+	+
15 Ingratiating	−	+	−	+	++
16 Irritable	−	+	−	+/−	++
17 Loud-voiced	−	−	+/−	−	+/−
18 Patient	+/−	+	−	+	+
19 Petulant	+	++	+	+/−	+/−
20 Pleasant	+/−	+	+/−	+/−	+/−
21 Having poise	−	+/−	−	−	−
22 Sarcastic	±	+	+	+	++
23 Self-conscious	±	=	−	+	+
24 Self-controlled	±	=	−	+/−	+/−
25 Serious	−	+	+	+	+
26 Soft-voiced	+	+	+/−	+/−	+
27 Sullen	−	+	−	−	+
28 Violent	−	−	−	−	−

VII. Emotional Tone	J	R	T	F	H	VIII Stream of Talk	J	R	T	F	H
1 Cheerful	+/-	+/-	−	+	+/-	1 Circumstantial	−	−	−	−	+
2 Cries often	−	+	−	+	++	2 Incessant	−	−	−	−	±
3 Depressed	+	+	−	+	+	3 Making repetitions	−	−	−	+	•
4 Excitable	+	+	++	−	+	4 Moderate	−	+	+	+	+
5 Laughs often	±	+	−	+	++	5 Raconteur type	−	?	−	−	−
6 Quick tempered	+	++	+	++	+	6 Rapid	+	+	−	−	±
7 Remorseful	+	++	−	+/-	++	7 Relevant	−	+	+	+	+
8 Repressed	+	+	−	+	+	8 Reticent	+	+/-	+	+/-	+
						9 Slow	−	−	−	−	+
						10 Tendency to unburden	−	+	−	+	−

IX. *Special abilities.*
Dancing, knitting, athletics.
Can do typewriting and thinks she may have special ability in this.

X. *Special causes of emotional reactions.*
Any treatment of a physical nature, such as dentistry, atropine dropped in the eyes, and physical examinations in general.
Restriction or discipline in any form.
Sympathy for friends who were in difficulty.

XI. *Special propensities not already noted.*

a. *Any manifestation of sex?*
Aversion to anything sexual in nature, either in conversation or actions, to an abnormal degree, even including necessary physiological information.

b. *Fears?*
Terror at any approach to physical realm as above.

c. *Evidences of feeling of inferiority?*
Feels educational and social limitations.

d. *Tendency to blame others for what patient herself is responsible?*
Yes.

e. *Getting pleasure through aggressive action such as cruelty or violence?*
No.

f. *Getting pleasure through submissive action such as suffering physical pain or through being forgiven?*
No.

g. *Attitude toward authority and discipline?*
Very resentful of both.

h. *Attitude toward responsibility?*
Variable.

XII. *Habits.*

a. *Of activity?*
She was always running up and down stairs and along corridors and accomplished very little work.

b. *Of thought?*
Tendency to brood and be seclusive.

c. *Of sex?*
None.

REMARKS

I 14 H *Reasoning ability* in abstract situations rather good but poor in concrete situations.
III 38 F She is *timid* in things concerning herself physically.
III 2 R *Ambitious*, good student.
III 31 J Indulges in gossip that leads to quarrels.
III 33 R Was very *untruthful* when she entered hospital but apparently improved much before going away.
IV 4–5 T Although not a *follower* in general, inclined to follow people whom she admires.
VII 6 T Shows *temper* if asked to do work that is distasteful.

SUMMARY

I. *Intelligence.* Of good intelligence, as shown in learning ability, memory, imagination, planfulness, mental agility, language ability and æsthetic appreciation. Shows rather good judgment and ethical discrimination. Is only slightly suggestible, shows some definiteness of purpose, good motor co-ordination and little originality. Her reasoning ability is good in abstract situations, poor in concrete ones.

II. *Work.* In her work she shows fair power of concentration, needing stimulation very much but responding well to it. Is variable in output of work, rather distractible and not very persistent. She is rather absent-minded but shows a fair amount of effort and varies in accuracy. She is fairly deliberate and skilful, is usually not automatic but is thought by two of the five judges to be clumsy. She varies in endurance and in ability to learn by experience.

III. *Traits.* She is of the over-active type and is rather timid. She is very loquacious, varies in sociability, is independent, egocentric, inclined to be self-pitying and self-justifying. Is very impulsive and opinionated but sensitive and easily offended. She is self-sufficient, varies in adaptability and is rather ambitious. She has a good sense of humor but is rather pessimistic. She does not seem to be a tale bearer, has not been known to steal while in the hospital and has only occasionally lied. She is always neat and cleanly. She is rather vain, extremely jealous, tends to be melodramatic, is fault-finding, and inclined to introspection and seclusiveness. She is kind-hearted, resourceful, but unreliable and shows great variability in taking responsibility. She is not hypochondriacal, has never shown any exhibitionistic tendencies, and is never profane nor obscene.

IV. *Type.* All but one of the judges consider her childish in type. She is a leader rather than a follower.

V. *Attitude.* In attitude she is responsive, and co-operative, and shows much interest in mechanical things. She is changeable, easily discouraged, rather conscientious, inclined to suspiciousness, never self-depreciative but usually self-assertive.

VI. *Manner.* In manner she is rather serious, affected, enthusiastic, occasionally boastful, rather forceful in an unconstructive way and at times very defiant. She varies much in pleasantness and frankness; is not very demonstrative, aggressive, or combative and never violent or assaultive. She is inclined to self-consciousness, varies in self-control and patience. She is sometimes sullen and petulant and at times very irritable; she is never apathetic, often ingratiating, but never flippant. She is sarcastic, and has few mannerisms.
In bodily attitude she is not awkward but rather graceful and dignified, has considerable poise and occasionally shows abandon.

VII. *Emotional Tone.* She is very excitable, very quick tempered, rather more inclined to be depressed than cheerful, is repressed to a considerable degree and shows a tendency to be remorseful. She laughs and cries frequently.

VIII. *Stream of Talk.* Moderate; sometimes repeats but to correct errors; is relevant but rather reticent, showing only a slight tendency to unburden or to be confidential.

GENERAL SUMMARY

This girl is of the over-active type, intelligent, egocentric, introspective, seclusive, excitable and rather inclined to be depressed. She is impulsive, opinionated, sensitive and easily offended. She is a fair worker but she is so variable in effort, accuracy, attention, deliberation and skill that her work cannot be depended on for either quality or quantity of production. She reasons abstract questions rather well, but cannot apply her reasoning ability to her own conduct.

There is suggested as a cause of her inconsistent and contradictory behavior a great fear of emotional things which points to unusual emotional repression that should be investigated. Her resentment of authority and discipline and her variability in taking responsibility imply much immaturity of development. Her sense of inferiority because of her educational and social limitations offers in part an explanation for her sensitiveness and her being easily offended. On the other hand she appears to be ambitious and is interested in typewriting which at least suggests some occupation on which to build.

A SURVEY OF THE PHYSIOLOGY OF CEREBRATION

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AS frequently stated, the study of consciousness resolves itself into a study of experience. This subject was first approached from the subjective side, and many essential facts were worked out in this way long before anything definite was known of the microscopic anatomy or the physiology of the different parts of the nervous system. In recent times numerous investigators have established a myriad of important facts in the latter fields, and clinico-pathology has contributed much to our knowledge of the subject.

It seems true beyond contradiction that a real understanding of the physiology of cerebration will require the correlation of the essential findings of investigators in psychology, neurology, physiology and clinico-pathology. That is what this paper attempts in a limited way. Our purpose requires a consideration of some of the most elementary facts of nervous physiology and psychology.

Owing to the ease of control of stimuli and measurement of response obtained, the study of nerve-muscle preparations long occupied a pre-eminent place in nervous physiology. As these studies have given the most unequivocal results, activity of the central nervous system has been largely interpreted by activity as revealed in peripheral nerves. In recent times, however, more and more attention has been given to the study of the physiology of the central nervous system proper. The long conduction tracts of parallel fibres in the central system are most easily available for direct study. These have been found to be essentially similar in function to peripheral nerves. In both cases the function seems to be the conduction of the excitation wave in unchanged intensity to a relatively great distance in the shortest possible time, according to Cajal's laws of economy of space, of time and of substance. (Cajal-Histoligie du Systeme Nerveux-Fr. ed. Vol. I, P. 138.)

The observation of spinal animals (an animal in which the spinal cord has been severed from the higher centers) has been very profitable as a means of study of the activity of the central nervous system and Sherrington established a great many facts in this way. (The Integrative Action of the Nervous System.) He gives the following points of

difference between conduction in nerve trunks and reflex arcs: As compared to nerve trunks, reflex arcs exhibit: (1) Slower speed, especially with strong stimuli. (2) Marked after discharge, especially with strong stimuli. (3) Less close correspondence between rhythm of stimulation and rhythm of end effect. (4) Less close correspondence between grading of intensity of stimulus and end effect. (5) Summation of stimuli — considerable resistance to the passage of a single impulse but a resistance easily forced by a succession of impulses. (6) Irreversibility of direction. (7) Fatigability in contrast with the relative infatigability of nerve trunks. (8) Much greater variability in threshold value of stimulus. (9) Refractory period, "bahnung," inhibition and shock in degrees unknown in nerve trunks. (10) Much greater dependance on blood circulation and oxygen. (11) Much greater susceptibility to various drugs.

These differences show that factors are present in central activity which are not revealed by a study of peripheral activity: not even a hint of some of these properties being found in nerve trunk conduction. The microscopic structure of the grey matter (where the distinguishing features of central activity are known to be acquired) is so complicated that definite linking of structure and function is not yet possible. Sherrington believes the seat of differences between central and peripheral activity lies in the synapses and presents much evidence to support the belief. These distinguishing features of reflex arcs are more like what is found in other forms of protoplasmic activity than is nerve trunk conduction. They correspond to what we would expect if the potential energy of the cells were being converted into kinetic energy as one step in the process. So we may imagine that when an excitation wave is conducted to the synapses of a neurone it institutes physico-chemical changes, which carried far enough, result in sufficient conversion of potential energy into kinetic energy (oxydative disintegration of Verworn) to generate an excitation wave or series of waves in the axis cylinder process. In other words, according to this conception the excitation wave reaching a synapse is not conducted across unchanged, as electricity across a splice in a wire, but it acts as a stimulus to the next neurone: just as light and other forms of energy act as stimuli to the special peripheral receptors. This stimulus may be supraliminal (i. e., sufficient to generate an excitation wave in that neurone) or it may be subliminal, that is, insufficient to produce an excitation wave in the second neurone. One might suppose that different neurones would show variations in

many of those features which distinguish reflex arc from nerve trunk conduction. That individual differences do exist in many of these respects is shown by a variety of evidence. Sherrington, working on spinal animals, established a number of facts in this regard, as follows:

The after discharge varies with different centers. That from the scratch reflex is usually not so prolonged as that from a flexion reflex produced by a stimulus of like length and intensity. The after discharge of the crossed extension reflex provoked with more than a certain intensity may persist, gradually declining, for ten to fifteen seconds. Nobody will deny that the different neurones show a difference in neurone threshold. There are variations in fatigability. In the spinal dog, the scratch reflex tires much more rapidly than the flexion reflex. It is only by assuming that there are individual differences in refractory phases of certain of the neurones concerned that we can explain the marked difference in refractory phase of different reflexes using the same muscles. In spinal shock the nociceptive reflexes suffer relatively little. That the different neurones show variations in their susceptibility to drugs is indicated by the selective action of morphine, strychnine and others. Thus it is evident that the neurones in the central nervous system do show variations in a number of ways, and the individual neurones exhibit a variable degree of irritability under different circumstances. Necessarily the degree of irritability affects the spread of excitation processes. We can only speak in a general way but if it were possible to measure these, we might use, as indicators of the degree of irritability, the neurone threshold and the ratio of intensity of stimulus to intensity of response, which we will call the *stimulus* response ratio; and it seems likely that the neurone threshold would be found to be different at different synapses of the same neurone.

This leads us to the consideration of summation or reinforcement of different stimuli. Adrian and Lucas found that in a peripheral nerve summation of subliminal stimuli occurs to a limited extent. If a second subliminal stimulus follows the first after about .0008 second, a nerve impulse results (Bayliss-Principles of General Physiology Second Ed. P. 391). This only occurs at the point of stimulation. In other words the disturbance produced by the subliminal stimulus is not propagated. In central activity however, the stimuli may be applied at different points. Exner showed that gentle stimuli applied to the skin of a limb reinforce closely following stimuli applied to the limb region of the cortex or underlying white

matter; that sound conveyed to the ear of a chloralized rabbit increases the amplitude of the reflex movement of the foot induced by a stimulus applied to the foot a moment later. Sherrington studied the subject extensively on spinal animals and what follows is taken from his work. He found that the scratch reflex cannot be elicited by a single induction shock and not by two unless they are very strong and less than .6 second apart. Very feeble shocks produce a reflex however, when repeated sufficiently. In some cases forty double shocks are required at intervals of 11.3 per second and forty-four at eighteen per second. In other experiments a fair shock is without effect but a second shock of the same strength even 1.4 seconds later produces a reflex (P. 36). Sherrington further proved that the effect he observed with stimuli applied at separate points was not due to a spread of the stimulus on the skin. A subliminal stimulus applied at a point A will render a subliminal stimulus, applied at a point B near A, supraliminal if the second stimulus follows within a short time, e. g., .5 second. The space of receptive surface across which this can be demonstrated in the scratch reflex amounts to 5-6 cm. The summation time in certain cases is as much as 1.5 sec. Thus summation occurs from separated areas. Cajal and others have demonstrated that, in many cases at least, the different axones connecting with the same neurone make contact at different points. For example, in the Purkinje cells, which are most easily studied, the cell body is enclosed in the terminal filaments of one axone, the dendritic trunks are in contact with the terminations of another, and the distal portions of the dendrites with another (Cajal Vol. I, P. 93). In regard to the motor cells of the anterior horn, Cajal says (Vol. I, P. 360) that unfortunately we do not know exactly how the protoplasmic apparatus enters into contact with the sensory collaterals of the first and second order, but he gives the following scheme as most probable. The voluntary or cerebral excitation is received mostly by the body of the motor cell. The indirect sensory or the sensory paths of the second order reach the motor neurone especially through the internal, anterior and external dendrites, in contact with which are found particularly the terminations of fibres from the antero-lateral tract. He thinks that the body is also concerned here. The crossed sensory excitations reach the motor neurones in two ways: by the dendrites which go to form the protoplasmic commissure and which may be in contact with the collaterals spread through the anterior horn of the opposite side, as well as by the crossed collaterals of the anterior commissure, coming

in contact with the cell body and internal dendrites. Thus it would appear that subliminal stimuli coming from different neurones do not reach a neurone at the same point, but nevertheless they reinforce one another if they fall within summation time. Of course we are here speaking of microscopic distances, so it is not surprising that such should be the case. It is evident, when one considers the histology of the grey matter of the central nervous system and especially the cerebral cortex, that summation of subliminal stimuli from different neurones must play a very important rôle in the spread of excitation processes.

The following from T. Graham Brown is a striking instance of cortical facilitation. After stimulation of the precentral gyrus, facilitation occurs so that stimulation of the post central gyrus produces a motor response, while without this facilitation even strong stimulation of the post-central gyrus evokes no motor response. This is not produced by a spread of the current, as freezing shows: nor does it occur when the connection between the post central gyrus and the precentral is severed. (Quart. Jour. Exp. Physiol. 10.) Urbantschitsch, Tanner and Anderson found the perception of weak colors rendered more acute with another stimulus added. McDougal found visual perceptions to be reinforced by stimuli coming from the ocular muscles.

The resistance offered by the different efferent synapses of a neurone would seem likely to affect the spread of the excitation process over the different collaterals of the axis cylinder. Many believe that during activity of a neurone the afferent synapses are rendered more permeable. Others would apply the "all or none law" to the central nervous system, according to which when a neurone is activated, all the collaterals of the axis cylinder would be activated at a maximum. In this regard Sherrington says (P. 76): "That in spinal reflexes increase of the intensity of the exciting stimulus causes increase in the number of motor neurones excited is clearly shown by the wider field of musculature seen to be engaged as the reflex irradiates under intenser stimulation. . . Even the irradiation which suggests extension to new units itself gives evidence of the welding of the units into functional unit groups possessing solidarity. When in the flexion-reflex the response spreads from the knee to the hip, the spread is not gradual but the hip flexion suddenly comes in marking a sharp steplike rise on the record. It is not as though the irradiation gradually reached the motor elements of the hip flexion center cell by cell:

the irradiation on involving that center forthwith evokes discharge from it, which, judging from its powerful effect, represents discharge from the center practically as a whole. The reaction as it irradiates treats the center as a whole.

"The great prolongation of the reflex discharge produced by intensifying the external stimulus is also against the increase of discharge being explicable merely or chiefly by implication of a greater number of motor elements. In the flexion-reflex the period of discharge may be lengthened ten-fold by increasing simply the intensity of the stimulus without lengthening it. In the 'crossed extension reflex' I have seen the period of discharge lengthened more than twenty fold. This argues that the grading of the motor discharge in these reflexes is in important measure due to graded intensities of discharge from the unit elements themselves, of which the reflex centers are compounded." So the "all or none law" does not seem to hold in the central nervous system.

It is thus evident that central activity is not the stereotyped process which it would be if it were governed by the laws of peripheral activity. The effect of a stimulus in central activity not only depends on the nature and strength of the stimulus and point of application but also on what other stimuli have just operated at that point or are operating or have just operated at other points. This is further shown by the phenomena of inhibition. Bianchi says (Text Book of Psychiatry Eng. Ed., P. 170): "It seems to me absolutely impossible to consider the inhibitory power as a specific function which may be exercised by certain organs on certain others. Such a conception is bound to disappear from the physiology of the nerve centers. I go upon the principle founded on observation of facts, that every nerve organ, particularly of the cerebral mantle, can in its turn be a center of inhibition and an inhibited organ, at different times and under different circumstances.

"The experience of every one at all times competently supports this theory. If one of the perceptive centers is hyperfunctionating under the influence of adequate stimuli, it becomes by the very fact a center of inhibition of the others with which it may be in anatomical relation. The sight of a picture which takes us by surprise, of a scene which pleases us, or the reading of a page which interests us, puts in hyperfunctionating tension one or more of the cerebral provinces, let us suppose the visual zones and the frontal lobes. If during the work of the visual region, a slight noise such as would

have been remarked in a state of repose is made, under these circumstances it passes unnoticed, or, even if noticed does not become a perception. The auditory center in such a case is inhibited by the hyperfunctionating visual center, and it is then unable to transform into perceptions the acoustic waves which arrive there, or, to transmit the products of its function to other provinces for further psychic combination. If, however, the auditory stimulus is very intense, it determines a hyperfunctionating state in the organ of hearing, and then, under the altered condition the noise is rendered perceptible but at the same time in which this happens the auditory center exercises an inhibition upon the visual center. . . .

"If, while walking, one is overwhelmed by a thought which involves great mental activity, unconsciously the pace is slackened: this is an inhibition of walking. If, on the contrary, one is bent on arriving somewhere, and the object of the walk is vividly represented, the pace will be brisk in proportion, nothing else crossing the threshold of consciousness, be it external or internal, will exercise a power of arrest on the walking unless it be substituted for the object of the walk. Then only has an extraneous thought the power of slowing the pace and even the consciousness of the object of the walk may in given cases succeed in slowing or arresting thought."

The experiments of Sherrington and others on spinal animals have produced many examples of this same form of inhibition. McDougal's theory of inhibition supposes that during activity of a neurone its afferent synapses are more permeable and this is sometimes called the drainage theory. Such a theory certainly explains most of the known facts of central inhibition.

We may imagine that during activity of a neurone the resistance of its afferent synapses is lowered. We may imagine also that the resistance of the different efferent synapses of a neurone affects the spread of the excitation wave over the different collaterals of the axis cylinder; it going in greatest degree to the synapses with the lower resistance. We may imagine further that a high resistance of the efferent synapses interferes with activity in a short neurone while a low resistance in those synapses facilitates activity.

It is readily imaginable that the last condition could be true of short neurones whose axones terminate at a short distance from the cell body, while conditions are different in the neurones with long axones forming conduction tracts and peripheral nerves. As stated previously the sole function of conduction tracts and peripheral nerves

seems to be the conduction of the excitation wave in unchanged intensity to a relatively great distance in the shortest possible time and consequently their form of activity is not a true criterion of activity in the grey matter.

Central inhibition is readily explained on the above basis as the following will show. We may imagine certain combinations of motor and sensory cortical neurones being highly active as the result of the action of certain external stimuli (not only the sensory representatives of the external stimuli being affected but also many other combinations which are activated by associative neurones) as for example, the sensory representatives stimulated by the picture which takes us by surprise, at a time when another and weaker foreign stimulus is received (the slight noise in Bianchi's example). As a result of this high degree of activity of certain combinations a lowering of resistance in their afferent synapses occurs. At the same time reinforcement is occurring among the highly active combinations. While certain elements of the combination of cortical sensory representatives representing the weak foreign stimulus may have been associated, as constituents of other combinations, with some scattered elements of the highly active combinations, there will not be any great amount of aberrant conduction to these foreign elements as they are only slightly activated. This slight degree of activity does not facilitate activity in aberrant associative neurones in any degree comparable to the facilitation produced in the associative neurones leading to the highly active combinations.

Consequently the synapses connecting with the associative neurones leading to the other highly active combinations offer less resistance than those connecting with associative neurones leading to the foreign combination. Owing to the degree of activity of the neurones of the highly active combinations and their overwhelming numbers, those which are connected by efficient associative neurones leading from elements of the foreign combinations will receive aberrant stimulation which they would not receive were they inactive. This is because the high degree of activity facilitates activity in those associative neurones and thus lowers the resistance of their afferant synapses. The elements of other foreign combinations, representing stimuli associated by experience with the foreign stimulus, will thus be deprived of stimulation which they would otherwise receive. So the formation of perceptions and ideas by the foreign stimulus will be prevented. The same state of affairs would determine inhibition or

reinforcement in the spinal cord, though here inherited structural connections would be the prevailing factors instead of the presence of associative neurones whose efficiency depends on the frequency of previous activity.

It must be admitted that any so called drainage theory of inhibition does not of itself offer a ready explanation of the conditions exhibited following interruption of the pyramidal tract, but Cajal's interpretation of these phenomena is not opposed to the drainage theory (Vol. I, P. 552).

It is appropriate to consider here the question of specific differences in the excitation process in different neurones. In peripheral nerves and in the long tracts in the spinal cord, physiologists have not found evidence of any difference in the excitation waves in different nerves or tracts.

It is not necessary to believe that there is a specific difference in the activity of the different cortical neurones, but it would seem more probable that the difference is simply in their connections, so that they represent different external stimuli on the sensory side, through their connection with the special receptors, or different movements on the motor side, through their connection with different muscle cells.

External stimuli activate certain peripheral sensory elements depending on the physical or chemical nature of the stimuli, the site of contact with the organism and the special selective sensitivity of the different sensory end-organs. The activation of a certain combination of peripheral terminations of sensory neurones will activate a certain combination of cortical sensory neurones. When it is said that a certain combination of cortical sensory neurones is activated, we do not mean to imply that the same number of cortical and peripheral neurones are activated, or that the arrangement of the cortical neurones is a counterpart of the arrangement of the peripheral terminations of sensory neurones, or that identical external stimuli always activate identically the same combinations of cortical sensory neurones. There is evidence that such is not the case. Nevertheless we would believe that stimulation of a certain combination of peripheral elements will activate certain cortical sensory neurones, depending on the strength of the stimulus and the degree of irritability of the different elements at the periphery and the neurones connected with them in the central nervous system. The relation between the peripheral elements and cortical sensory neurones seems quite comparable to that of the motor system. In the latter case we know that

the arrangement of the cortical motor neurones and the muscle cells activated by them is different, yet stimulation of a certain point of the motor cortex produces a definite muscular response. The arrangement of a telephone switchboard is different from the arrangement of the instruments themselves though each instrument is represented. The arrangement of neurones undoubtedly can largely be explained by Cajal's laws. (Vol. I, P. 138.) So according to this conception, which is held by a number of neurologists, the excitation process is essentially the same everywhere but neurones differ in their connections, neurone threshold and other characteristics previously mentioned and it would appear as already mentioned that in certain features of activity, short neurones differ from long neurones.

The influence of use and disuse is manifested in many forms of protoplasmic activity. Often the effect is very pronounced and leads to marked structural changes. We see examples of this influence in the atrophy of disuse of muscles and other tissues and in the compensatory hypertrophy of different structures. While these changes occurring in the higher animals are intimately associated with changes in the blood supply of the affected structures, it is almost generally agreed that we also have to deal with a more general physiological adaption, such as Hering calls the internal self regulation of metabolism. In many instances we see a change in functional capability, as a result of this influence, without demonstrable structural changes; as for example, in learning to perform some delicate act of coordination. It is not to be doubted however, that material changes of some sort always occur. It seems to be a general rule of living tissue, that within certain limits, an increased stimulation of a particular activity results in an increased capability of activity in that direction. Similarly the converse of this seems true, lack of stimulation of a particular activity results in a decreased capability of activity in that direction. In other words we would say that within certain limits functional activity promotes functional efficiency, remembering that activity implies a stimulus of one kind or another. In the majority of the tissues of the body the stimuli which activate the cells appear to be chemical bodies, which as yet are little known, so they are beyond experimental control. Nevertheless the compensatory changes which occur in many of these tissues as a result of the gradual removal or destruction of portions of them would indicate that this principle applies to them. In such cases the remaining tissue probably receives most of the stimulation previously affecting the whole.

On the other hand, in the muscular and glandular tissues which receive their stimuli from the nervous system, the activity is more directly under experimental control and the degree of activity is easily measured. Here the influence of activity on functional efficiency is well known, as exemplified in the relation of exercise to muscular strength. The corresponding structural changes are so marked that many were led to believe in the existence of special trophic fibres going directly to the muscle cells, but this has been disproved.

If we turn to the nervous system it is apparent that this principle applies there with particular force. Witness the effects of practice on delicate co-ordinated movements. The influence of practice on delicate perceptions is equally marked as shown by the trained "eye" of the artists, etc. While in many of these instances there is undoubtedly an unusual degree of native ability in a particular field, the effect of practice is no less marked. The acuteness of tactile perceptions was experimentally studied by Volkman, Vierordt, Dresslar and others (Bianchi P. 183) and found to increase rapidly with practice, while it decreased again after cessation of practice. The influence of use or practice in all conscious activities is so potent and so apparent as to require no more than mention. The terms education, study, practice and training all imply development of function by use, and the degree of development possible in these directions in human beings seems unlimited compared to that found in muscular and other tissues. The general rule stated above is thus seen to be especially applicable to nervous tissue in general, but to incomparably the greatest degree to the human cerebrum. As there is practically no increase in the number of neurones after childhood, we cannot attribute the increased efficiency produced by activity in adult life to the multiplication of neurones, nor is there evidence of marked changes in blood supply, so we must attribute the change in functional capability to changes in the individual neurones which are activated. This would mean in terms of general function an increased irritability: i. e. a lowered neurone threshold and *stimulus* response ratio. It thus would seem that following activity, through what Hering calls the internal self regulation of metabolism in the individual neurones, the irritability is restored to a somewhat higher level than before. Accordingly we would believe that stimuli of proper strength, under proper conditions, produce a two-fold effect in the neurones of the central nervous system. They not only cause momentary activity resulting in the production of excitation waves but also leave their imprints in the

shape of a comparatively lasting increased irritability. It does not seem unreasonable to believe that the change occurs in the synapses so that synapses connecting neurones which have been frequently active, are more irritable than those connecting neurones which have not been active and consequently such neurones have a lower neurone threshold. Disuse apparently results in a gradual loss of the increased irritability, but experience shows that it is easier to revive what has been forgotten than learn the new, so there would seem to be some permanent change. One sees here and there in the literature an idea of this kind expressed in various ways, but the majority of writers hardly mention what would seem to be a fundamental characteristic of neurones.

The neurones of the different regions of the central nervous system manifestly do not all show the same rapidity of change in functional capability as a result of activity. In the spinal cord this property would seem to be comparatively slightly developed. On the other hand considering how rapidly associations may be formed, it would seem that this general property of protoplasm has been developed by evolution to a marvellous degree in the human cortical neurones; if, as brought out later, the development of associations is due to a lowering of the neurone threshold of those neurones by activity.

In one way, coincidences seem to contribute most to learning by experience. All of the varied stimuli constituting one's experience with the outer world may be considered as a chain of coincidences so far as the individual's nervous system is concerned. Physiologically experience consists of various stimuli of different physical or chemical nature operating on special sensory end-organs and a number of different stimuli are always acting simultaneously. The word coincidence is used here in a broad sense and covers what is frequently called contiguity. In what we may call a coincidence of the first type, the experiences, if we analyze the peripheral stimuli constituting them, have nothing in common but a concurrence in time. In a coincidence of the second type, portions of the experiences which are indefinitely related in time coincide: that is to say some portions of the peripheral stimuli are identical, as the words telegraph and telephone. Resemblances are coincidences of the second type, in that two or more experiences, be they comparatively simple or very complicated, which resemble one another coincide in some particular. We have indirectly a time element in this type, as the common group of stimuli occurs with certain others forming the one experience:

and with others forming another. Furthermore by coincidence we do not mean to imply an exact concurrence in time, but an approximate one: a certain indefinite interval often elapsing between the "coincident" stimuli. So we would say in all experience there is the frequent coincident stimulation of certain combinations of cortical sensory neurones at one time and another: tactile, visual, auditory, etc. While it is often convenient to classify associations in numerous groups, nevertheless it would seem that all might be traced back to a coincidence of stimuli. In the adult past experience, in the shape of all the external stimuli which have played on the peripheral receptors, is so extensive that we are not apt to recognize this factor in every instance. So we say an association is due to resemblance, contrast or other factor, which in the light of experience may be traced back to a complicated series of coincidences of stimuli. The subject of association has been studied extensively from the subjective standpoint. The results obtained by psychologists employing this method have been very definite, and details too numerous to mention have been worked out.

Pavlov's conditional reflexes in dogs are established by concurrent stimuli. He used the salivary secretion chiefly as the object of study, making a salivary fistula, so the secretion could be measured. A fundamental condition for the formation of the conditional reflex is that, whatever indifferent stimulus is chosen for the purpose of the reflex which it is desired to build up, it is given at the same time that the food or acid is introduced into the mouth. After a few sittings it will be found that this formerly indifferent stimulus alone is now capable of calling forth a secretion of saliva. The stimulus for the conditional reflex must not follow the feeding reflex and is most efficient when it slightly precedes the introduction of food or acid. (British Med. Jour. Oct. 18, 1913.) In an animal from which the cerebral hemispheres have been completely removed it is impossible to form any conditional reflexes.

Some of the properties of the conditional (or associative) reflexes are worthy of notice. The rapidity with which they are formed varies with the stimulus used. In the dog, olfactory conditional reflexes are formed more rapidly than visual or auditory, and with disagreeable more rapidly than with agreeable odors and conditional reflexes are formed with interrupted more rapidly than with continuous sounds. The amount of saliva produced at first is only one or two drops, but later it increases up to seven or eight and may con-

tinue at that quantity for several months. The reflexes may be formed from stimuli exactly coincident or the artificial stimulus may precede the natural stimulus by thirty seconds or a minute. In the latter case when the conditional reflex is established, the secretion of saliva follows after the same interval which has been previously employed.

The conditional reflexes are gradually abolished if they are repeated frequently without being accompanied now and then with the non-conditional excitant with which they have been formed. Inhibition in relation to conditional reflexes has been extensively studied. Wasiliev demonstrated three phases in inhibition. He added foreign stimuli to the conditional reflex formed with the scratch stimulus-light or the sound of a metronome, without reinforcing them with the non-conditional excitant. In the first phase, depending on its strength the foreign stimulus inhibits the conditional reflex more or less. If it is strong enough it may completely inhibit it. If the combination is repeated the inhibited conditional reflex gradually resumes its original magnitude; the second phase. Here the inhibition stimulus is without effect. However, if the combination is repeated without adding the non-conditional stimulus the third stage is reached in which the reflex will diminish more and more until it ceases. Zovadzke demonstrated inhibition of inhibition. In adding a foreign stimulus to the conditional stimulus during the latent period of salivary secretion he observed the appearance of the reflex, while previously this foreign stimulus had not produced the reflex. This was notably the case in the retarded reflexes. This inhibition of inhibition was only obtained with stimuli of proper strength. Too weak stimuli failed to produce this effect and too strong stimuli inhibited the reflex altogether. Other phenomena noted in conditional reflexes are irradiation and concentration of excitation processes. (Pavlov.)

If a conditional reflex is prepared with a certain sound, and that reflex has been prepared according to the principles set forth, that is to say that sound has been repeatedly accompanied with feeding or putting acid in the mouth, the corresponding reflex and desired secretion will have been obtained. Say the reflex has been established with a sound of eight hundred vibrations per second and that sound regularly gives the conditional reflex. Then try another sound. That sound will then act even when there is quite a difference in pitch (as 100–200 or 20000–30000 vibrations). We have associated the alimentary center with a single excitant and the excitant has become

generalized. That permits us to speak of irradiation, for the excitation arriving in a given cell of the cerebral hemisphere does not remain there alone, but irradiates to the neighboring cells. However, if the experiment is continued, repeating the reflex with the eight hundred vibrations, it becomes more and more specialized so that finally the reflex will be obtained with eight hundred vibrations but not eight hundred and twelve. At the beginning the excitation irradiates: after frequent repetitions of the same stimulus the excitation becomes concentrated. The conditional reflexes demonstrate further that the spread of excitation processes is determined by the potency of the centers which act upon one another. The center of nourishment is physiologically very powerful. The center of movements of defense is weaker. Erafeieva used strong electric shocks which he applied to the skin of the animal. These caused the animal to make all possible movements of defense. But, associating food with these nocuous stimuli, after a certain time he no longer succeeded in obtaining movements of defense but the animal looked towards the place where his food was brought and salivation was produced. This cannot be done with the acid reflex as this is a weaker center. Bechterew and his pupils established what he calls associative reflexes in human beings, employing motor responses. They found practically the same characteristics as those cited. (Issailovitsch-Duscian: Reflexes Conditionnels ou Associatifs Pp. 27–49.)

Considering the studies of association by psychologists and the studies of conditional reflexes, we cannot escape from the conclusion that when special combinations of cortical sensory or motor neurones are frequently concurrently stimulated an intimate association is formed between them, so that they stimulate one another with great facility. The development of associations between special combinations of cortical neurones would most naturally be thought to be due to an increased irritability of the synapses connecting them so that certain sensory or motor neurones more readily activate certain other sensory or motor neurones by way of the neurones connecting them. This changed condition of the synapses might, according to our rule that functional activity promotes functional efficiency, be attributed to previous functional activity. It would then appear, other conditions being the same, that synapses of neurones forming pathways between coincidently active cortical neurones are activated to a greater degree than synapses in other directions, which communicate with inactive neurones. Otherwise there would not be the special

direction of development of associations. Here then is a condition which is in no way hinted at in the study of nerve trunk conduction. However, it may be explained on the same basis as central inhibition. The fact that the same characteristics which we presumed neurones possess in explaining inhibition will also explain the development of associations by experience makes it more probable that those characteristics actually exist.

As stated above, we supposed that during activity of a neurone the resistance of its afferent synapses is lowered. Also the resistance of the different efferent synapses of a neurone affects the spread of the excitation wave over the different collaterals of the axis cylinder; it going in greatest degree to the synapses with the lower resistance. Furthermore a lowered resistance of the efferent synapses facilitates activity in a short neurone.

There is considerable evidence showing that when one cortical center is activated through projection fibres the excitation process is irradiated to numerous other cortical areas. We may imagine that the axones of the neurones which effect the above irradiation connect with short neurones each of which connects with a number of neurones of the nearby center. We may imagine further that the synapses between these short neurones and the neurones of the nearby center, unless previously active, offer considerable resistance so that the excitation is arrested without activating the neurones of these other centers (excepting pathways concerned in reflex and instinctive actions). In other words while the excitation process is irradiated it does not always excite other centers to activity.

However if certain of the neurones of the nearby center are active, the resistance of their afferent synapses is lowered and the activity of the connecting short neurones is facilitated.

If we imagine further that the property discussed earlier (by which activity leaves its imprint in the shape of a comparatively lasting increased irritability) is developed to an extreme degree in these synapses, it is apparent that after a few repetitions of concurrent activity, the excitation coming from certain special neurones of the distant center will suffice alone to activate certain special neurones of this center and we will have an association developed.

In accordance with these ideas, after a number of repetitions of coincident stimulation of special combinations of cortical sensory neurones, there would be a complicated series of pathways with highly irritable synapses developed between them. Stimulation of one

combination of sensory neurones would then stimulate the rest by way of these associative pathways. It is undoubtedly true that after the individual had passed through varied experiences, some of the elements of certain combinations, having been elements of other combinations, would stimulate irritable synapses in other directions. We would believe that during activity some such aberrant excitations are always present. They would account for the occurrence of ideas without obvious connection and would seem to be important factors in diseased conditions. On the other hand, the individual elements of a given combination representing a given external stimulus which had often acted on a special peripheral receptor, having been frequently coincidently active, would be interconnected by pathways of irritable synapses. This would not be the case with the scattered elements which receive aberrant stimuli through efficient associative neurones, by virtue of having, at one time and another been coincidently active with certain elements of the highly active combinations in question, when these elements were constituents of other combinations at present inactive. This is because there are not pathways of irritable synapses between those scattered elements, as the periods of stimulation through projection fibres will not have coincided. Thus there would not be the mutual reinforcement among the elements stimulated by aberrant impulses, which we may suppose occurs among the constituents of combinations which have been frequently active. It is probable, too, that inhibition comes into play here.

To briefly review, we would believe that the functional unit of the nervous system is the neurone and the fundamental function of the neurone is to react to stimulation by the production of excitation waves in the axis cylinder process: that the spread of activity is determined by the neurone threshold and *stimulus* response ratio of the different neurones, which depends on the irritability of the different synapses. Further that the irritability of cortical synapses is rapidly increased by repeated activity (producing a lower neurone threshold and *stimulus* response ratio) and finally that activity in neurones lowers the resistance of their afferent synapses and the resistance of the different efferent synapses influences the spread of the excitation wave over the different collaterals of neurones and a lowered resistance of the efferent synapses facilitates activity in short neurones. On this uniform basis we shall briefly attempt to explain the development of experience.

The emotional representatives seem to play an especially impor-

tant rôle in the development of experience. Their intimate relation to the process of attention is indicated by the persistency with which objects or events having strong emotional value remain and recur in consciousness. General observation shows that only those stimuli which in one way or another are of interest attract and hold the attention, i. e. those which directly stimulate or have been associated by experience with emotional representatives. The importance of this emotional factor in attention has been emphasized by Maudsley, Carpenter, Ribot and others. (Bianchi P. 227.)

It has long been believed that there is a motor adjustment occurring in attention, favoring the reception of certain external stimuli to the exclusion of others, or in more ideational moments tending to diminish the reception of all external stimuli. It would seem that the emotional representatives are in as intimate relation with this motor adjustment as with other motor activities.

While we do not know the exact location or distribution of the emotional representatives, there seem to be good grounds for believing that excitation processes resulting from strong stimulation of these neurones are more intense than those from other sensory representatives; that is, the potential intensity of response of these neurones is greater than others. At least the influence of feelings and emotions on conduct and thought is everywhere apparent and their potency seems responsible for most of the vagaries of human thought and action. The fact that periods of strong feeling tone are generally periods of wakefulness would also favor this view. Under such circumstances the emotional representatives seem to keep the higher centers active in spite of fatigue. Crile and Cannon have shown that the ductless glands and vegetative nervous system play an important rôle in these conditions. To quote Sherrington again (P. 231): "It would seem a general rule that reflexes arising in species of receptors which considered as sense organs produce strongly affective sensations cæteris paribus prevail over reflexes of other species when in competition with them for the use of the final common path." If we suppose that the somesthetic neurones are capable of producing stronger excitations than cells of other sensory functions we can explain many aspects of thought and action. These stronger excitations would reinforce particular combinations with which the somesthetic representatives had been associated, and as a result of this increased activity other combinations not included in the particular chain of associations would be inhibited. Thus we may think of the emotional representatives

having a double relation to attention, through their close connection with the motor adjustments and by the inhibition of foreign combinations produced by the increased activity of neurones stimulated by them.

Observation of new-born infants indicates that their earliest definite manifestations of consciousness come from stimuli affecting somesthetic neurones (stimuli related to nutrition and to reactions which if conscious would indicate pain or discomfort). Certain combinations of visual, tactile or other cortical sensory neurones are coincidently stimulated with certain combinations of cortical somesthetic neurones. According to the above considerations we would expect a reinforcement of the special sense representatives by the somesthetic neurones, resulting in associations between the particular combinations coincidently active.

Hand in hand with the development of sensory functions there would be a development of motor functions by a similar process. During and as a result of movements there would be coincident stimulation of particular combinations of motor and kinesthetic cortical neurones and in many instances of sensory representatives of external stimuli of a changed environment produced by the movement, be the movement one involving the whole body or but a single part. As a result the individual neurones of these combinations would become more efficient and as a result of coincident activity associative pathways would be formed between the different combinations of cortical neurones.

Such a process would account for the development of voluntary movements. Many of these first movements appear to be haphazard reflexes with little evidence of purpose. These reflexes however establish, by coincident stimulation, associations between particular groups of cortical sensory, motor and kinesthetic neurones: thus laying the foundation for voluntary co-ordinated movements. At times some of the movements which have no conscious purpose may effect such changed environment as regards external stimuli, that somesthetic stimuli are received which produce definite reflexes which we call instinctive reactions. If we try to consider the different combinations which are coincidently stimulated during such an experience, we see that there will tend to be developed, many associative pathways. We have coincident activity of the special sensory representatives of the external environment and of the motor and kinesthetic representatives of the movement which produces the changed

environment. Then the somesthetic reflex adds coincidently stimulation of somesthetic representatives, the motor neurones activated by them and the kinesthetic neurones representing the movement. If the stimuli from the emotional representatives are very strong, as often seems to happen with nocuous stimuli, such efficient associative pathways may be developed by a single experience that on a later occasion the somesthetic reflex may be produced by association from the original stimulus, with a consequent inhibition of the first reflex and this in the absence of the nocuous stimuli.

Thus motor experience would be developed in conjunction with sensory experience: actions of greater complexity and resulting both from more numerous and more selected stimuli, being developed as a result of the formation of associations, from combinations of comparatively simple reflexes which depend on the general physical or chemical nature of the stimuli and the point of contact with the organism.

As an example of the conjoined development of sensory and motor functions we may take the complicated process of learning to talk. The sounds produced early in life appear to be reflex and mostly from somesthetic stimuli. When sounds are uttered, there is the coincident activity of particular combinations of cortical motor neurones, of kinesthetic neurones and of auditory neurones, as well as the particular combinations of sensory neurones representing the stimuli which prompt the utterance. So by frequent repetition associative pathways will be formed between all those combinations. The auditory neurones representing sounds which at first are produced reflexly come to be associated with the motor neurones representing the movements involved. On account of these associations sounds later are produced not only reflexly by somesthetic stimuli but also by auditory stimuli, when we have imitation.

Thus we would believe when a sound is first uttered it is a comparatively simple reflex. The associations formed by its production, between the cortical motor and kinesthetic, auditory or other neurones permit of its reproduction by auditory or other stimuli. So the development of speech would be due not alone to the development of the motor speech area but to the concomitant development of the different sensory areas as well and of associative pathways between all.

The same sort of complicated development would be thought to occur in all motor activities. It is self evident how these ideas lend themselves to explain the formation of habits through frequent repetition of given movements.

So while the principles here suggested as underlying the development of experience seem to be comparatively simple the details of the process appear fully as complicated as cerebral histology would lead one to expect.

The marvelous complexity of abstract concepts according to these views is apparent when we take such a simple example as "chair" and consider it from the standpoint of vision. A chair of given size and shape will stimulate a different combination of cortical visual neurones for every appreciably different position it may occupy in the visual field in any of the three dimensions of space. Those different combinations are associated with all the different combinations of other cortical neurones representing the word "chair" as a result of experience. When we consider the variety of shapes of chairs, we see what an endless number of visual combinations are associated with all the other combinations of cortical sensory neurones entering into the formation of the abstract concept chair.

In the ordinary adult there must be millions of special combinations of efficient cortical neurones connected by efficient associative neurones. The sensory representatives then activated by given external stimuli might be connected by efficient associative pathways with any number of combinations of sensory and motor representatives, which at one time and another had been coincidently active with the combinations in question. The particular combinations stimulated supraliminally by associative neurones would seem to be determined by the resultant of a number of factors, such as frequency of coincident activity, efficiency of associative pathways with combinations of emotional representatives, recency of activity or other conditions influencing irritability and the concurrent activity of other combinations as related to the facilitation of associative neurones.

The objection may be made that the distinction between the conscious and the unconscious has not been preserved in this paper and that is true enough. No attempt has been made to cover the whole subject of cerebration, but only to discover if possible a coherent theory of the physiological basis of experience. In this connection it may be said, that, given an animal with a nervous system structurally like one of the higher animals, with neurones responding to stimulation by the production of excitation waves, with receptors responding to specific stimuli, and with the neurones of the cerebrum having the characteristics which we have attributed to them: then such an animal would necessarily show evidences of learning by experience

and memory. This too without being forced to believe that the excitation process is essentially different in one neurone from another, no matter what the location.

So to explain learning by experience we add to the facts established by experiment and observation these surmises based on theoretical considerations:

(1) Stimuli of proper strength under proper conditions, not only cause momentary activity in cortical neurones but also leave their imprints in the shape of a comparatively lasting increased irritability as a result of the increased irritability of the afferent synapses.

(2) The momentary activity in cortical sensory and motor neurones not only results in the production of excitation waves in their efferent processes, which conduct them to distant neurones, but also during this period lowers the resistance of their afferent synapses.

(3) The resistance offered by the different efferent synapses of a neurone influences the spread of the excitation wave over the different collaterals of the axis cylinder.

(4) A lowered resistance of the efferent synapses of a short neurone facilitates activity in that neurone.

A STUDY OF THE METHODS OF REVIVALISTS

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THE investigation which it is the purpose of this paper to report was conducted to ascertain the various methods employed by ministers and professional evangelists in conducting revivals. In particular the aim was to discover the factors of religious and social psychology involved in evangelistic methods. The information was obtained from ten ministers who conducted their own revivals, ten professional evangelists, and observations of the methods of five additional evangelists. The ministers and evangelists studied were selected by reason of their many years of experience, some of them being of international fame. They represent the Methodist, Presbyterian, Baptist, Christian, and other protestant denominations. With the ten ministers and ten evangelists the questionnaire method was employed. A more satisfactory result could have been obtained had a "cross-examination" been possible. This of course was not practicable since it was necessary to conduct the study by correspondence. In the cases of the latter five evangelists, the writer made a direct observation of their methods. One of these evangelists was questioned as well as observed in his work. The questionnaire read as follows:

1. Tell what methods you rely upon to obtain results in revivals?
2. What are the most effective methods you employ?
3. Do you advertise? In what manner?
4. Do you make meetings attractive by music, etc.?
5. Do you appeal to fear of hell, death, etc.?
6. Do you appeal to any other feelings? Which?
7. Do you appeal to hope of reward?
8. Do you use suggestion or hypnotism to any extent?
9. Do you organize your work?
10. To what do you attribute results?
11. To what do you attribute results principally?
12. Do you believe that mass psychology aids you?
13. Do mannerisms aid you?
14. Do striking phrases aid you?

15. Do you think revival converts remain in the church? To what extent?
16. What is the most frequent age of conversion in men and women?
17. What objections do you meet? The most common?

In response to *question 1* various answers were received. One minister said that he was always afraid of the so-called revival, and never had held one in the sense we here use the term. He believed in keeping the church always in state of spiritual life. He refers to the Billy Sunday Campaigns as a type of undesirable revivals. Nineteen placed a strong emphasis upon the fact that nothing surpasses the simple, earnest, faithful preaching of the gospel, accompanied by the power of the Holy Spirit, obtained by believing prayer and humble, implicit obedience to God's will. One man said that he was only the instrument to be used to obtain results; the Holy Spirit did the work. It was not his business whether the revival was a success or not so long as he allowed the Holy Spirit to use him. Several rely upon cottage prayer meetings preceding the revival, and several upon personal workers. One employs card signing.

Question 2. Nearly all answered the first two questions as one. All emphasized the plain preaching of the word as found in the scriptures, the influence of the Holy Spirit, prayers, and personal work. One mentioned card signing as effective. Two emphasized the fact that personal work should be done inside and outside the meeting. One mentioned home visitation, and one the testimony meeting.

Question 3. In regard to advertising, one replied that "you cannot advertise too much. The world uses it, why not the church?" One does not believe in it at all except through the people, and another advertises very little. One man says he advertises through printers' ink, but best through a sentiment aroused by preparation. One says he has never practiced advertising much. The remainder all replied that they used various means to attract the attention of the people: the press, the bill board, cards to be used personally, "catchy subjects," etc.

Question 4. "Make the music attractive if possible, but by all means make it spiritual," was reported by one. Another said that nothing, except preaching, contributed more to the success of a meeting than good music, vocal and instrumental. Still another answered that there is power in music that will reach many a soul that nothing else can. One said that music is always helpful; but it must be gospel

music. One, who believes in the Divine call of music, said nothing will stir people so much as music. To one music is "two-thirds of a revival meeting." Another said that it is a means of getting persons not interested in the gospel out to the meetings. All believe in music, some to a greater and some to a lesser degree.

Question 5. "Do you appeal to the fears of Hell, death, etc.?" brought out a great many different answers, some of which we quote verbatim. One man replied, "If it were possible to frighten a man into heaven, he would get out as soon as the scare was over. If a man loves God, etc., he won't fear death, and he will not care whether there is a hell or not — and if he would go to hell he would take heaven with him."

Other answers read as follows: "Jesus Himself always appealed to man's fears as motives of purity." "People frightened into profession soon fall away." "Only as the message of God's word appeals to these fears." "Yes, when conditions demand it." "If there is a heaven to be saved for, there is a hell to be saved from." The others believe in it only as the Holy Spirit convicts men of such fears.

Question 6. Nearly all answered this question in the affirmative and gave, as the other feelings appealed to, the following: duty, responsibility (to self and children), and the desire to succeed. One said that nothing short of eternal life is success. Another said that the "Love" side of the gospel must be preached. Other feelings appealed to were gratitude, natural affection for kindred, shame, self respect, desire for happiness, conscienee, "mother's prayers," and "any feelings that may move men in the right direction." Ten men said they appealed to love.

Question 7. As for the appeal to hope of reward, one acknowledged its use "only as a subordinate motive," and one replied "not to any great extent." Another said "Yes, but only as a consequence of conduct." One said "Sometimes," and another "Somewhat," but he preferred to appeal to the blessedness of service. The others all reported that they appeal to a hope of reward as it is taught in the bible; that such an appeal is perfectly legitimate, etc.

Question 8. One reply is that no one can discount the power of suggestion. Seventeen say they do not use suggestion at all or not consciously. Some think that it may enter into their work unconsciously. One says that suggestion is a great power; and hypnotism enters into work with some types of people. Another says he uses suggestion by others' actions.

Question 9. Fifteen say that they believe in organization in revivals. One man "does not organize in any systematic way." Another does not uphold the extreme use of organization, while another believes in very little. Most of them, however, believe in the organization of revival work and employ such organization.

Question 10. To this question again many different answers were received. Ten attribute results in revivals to the Holy Spirit, prayer, personal work of the Christian people, and music. One ascribes success to past teaching and training, and to the inborn feeling that every soul ought to return to God. Another mentions preparation of the church, consecrated workers, and the faithful presentation of the word.

Question 11. Nearly all answered this question similarly to the preceding one and placed the emphasis upon the power of the Holy Spirit, the preaching of the word, personality, and prayer.

THE ANSWERS TO THE IMPORTANT QUESTION

Question 12. "Do you believe that mass psychology aids you?" were not very satisfactory. Some said that they did not understand the question; others showed by their answers that they did not. One said that mass psychology does not appeal to him as to many others. Two answered the question in the negative, and one said "only in a limited degree." However, we may read between the lines of the answers that mass psychology does play a part in revivals. The direct observations, moreover, of the work of the five evangelists studied at first hand show it to be an important factor.

Question 13. Fifteen answered this question in the negative. One replied that mannerisms sometimes hinder, another that he hates studied mannerisms. A third responds that if they are not crude they are decidedly helpful. That they catch and hold the attention of a revival assemblage, most workers would doubtless admit.

Question 14. This question, with a very few exceptions, was answered in the same manner as the preceding one. All who say that striking phrases do help account for it by the fact that they arrest attention and thus afford an opportunity to teach valuable truths. One protests that he hates "put phrases." Another says that they are "clinchers of truth." This question and its answers tend to show that a great many ministers and evangelists do not know definitely just what they say certain things for, or why they say them in a certain way. The reason is perhaps because they are not students of their

work; also no doubt because they are more interested in the causes for their failure than for their success. As in the case of mannerisms, and as observation confirms, we may see that striking phrases tend to gain attention.

Question 15. All agree that revival converts remain in the church. Some say that it depends upon the nature of the revival. Others say that it depends upon the care they have after the revival is over. Still others maintain that every impulse the church has ever received came from a revival service or the effects of one. Some assert that a large portion of the present membership of the church became members under the influence of a revival, and that there are therefore a great many who remain faithful. One minister said: "The Apostolic church was built on revivals. The Methodist church was the outgrowth of a revival held by Wesley. Thousands of church members in Philadelphia, converted in Moody's meetings many years ago, gathered as a body a few weeks ago. Cities where Billy Sunday has been report that after two or three years 80% or more of the converts are still active in the church." Another man, however, replied that experience has taught him that only about 25% remain in the church. Still another said that they do not remain "if the bars have to be let down to allow them to get in." The twenty men answering the question are nearly unanimous that a large majority of converts remain in the church.

Question 16. We may remark, in regard to age of conversion, that there was no distinction made between men and women. Seven different answers were given to this question. Two think the most frequent ages of conversion to be between 15 and 22, nine think between the ages of 10 and 20, two between 25 and 30, one between 18 and 25, five between 30 and 40, and one between 18 and 21. The answers to this question lead one to believe that many of the correspondents were not sure and in order to answer something have merely guessed. Some admit this frankly, while the answers of others show it just as plainly. As a general result, the most frequent age indicated is about 17.

Question 17. A great many objections to going to church were named. For the most part these give the impression of persons excusing themselves for not yielding in revivals. Men seldom tell their real objections; those they give are often evasions. The following are some of the objections stated: "Wait for a more convenient season," "cannot hold out," "man can be saved by character," "cannot

understand the whole Bible," "I am not good enough," "I have not had a conviction yet," "too much excitement," "God could not be just and send one to Hell," etc. In answer to the second part of question 17, of the twenty, all are agreed that the most common objection is that there is hypocrisy in the church. We may also add that this was the answer given to the same question by 235 out of 250 personal workers at the Northfield Conference.

SUMMARY

In consideration of the experience, character, and number of revival workers studied in this research, we feel warranted in drawing the following definite conclusions. Those conclusions of course apply only to revivals among American protestants.

1. A strong emphasis was placed upon the fact that as a revival method nothing surpasses the plain earnest presentation of the word of God. This, accompanied by the Holy Spirit, obtained by believing prayer and obedience to God's will, and cottage prayer meetings just preceding the revival must bring about results.

2. A great many ministers and evangelists do things without knowing just why. Apparently, no distinction has been made by most of our subjects between methods and most effective methods.

3. All ministers believe in advertising, some to a greater and some to a lesser degree. Evangelists are all firm believers in advertising.

4. Music plays an important part in any church service; this is especially true of revivals. The music should be made attractive, but evangelists insist that it should also be spiritual.

5. All workers appeal to fear of hell and death, with various motives and in various ways. Some do this unconsciously.

6. Other feelings also, such as love, shame, self respect, happiness, conscience, "mother's prayers," etc., are appealed to.

7. Hope of reward is appealed to. But its importance is minimized.

8. The answers to the question regarding suggestion and hypnotism show a poor knowledge of psychology. There is no disputing the fact that suggestion is used by all ministers and especially by evangelists, even though in some instances it is used unconsciously. One cannot discount its power. Hypnotism is also more or less employed.

9. In every revival which is great from the numerical standpoint organized effort is important. Whether the results brought

about through organization are permanent, is of course another question.

10. Results are attributed by revivalists to the faithful presentation of the Gospel, the influence of the Holy Spirit, prayers, personal work, and service. All agree that no permanent result can be obtained except by the work of the Holy Spirit.

11. Preaching the gospel, prayer, Holy Spirit, and personal work are the principal agencies to which results are attributed.

12. Many evangelists and ministers are not students of their work. They are more interested in the reasons for failure than for their success, and many times do not know why men are converted. Some admit it, others show it plainly by their answers. Mass psychology, mannerisms, striking phrases, etc., play important parts in revivals. Many evangelists know that a great many men and women become converts, or come with the crowd, who would otherwise remain away. Perhaps if this were not true many would also remain in the church who drift away.

13. The agreement was nearly unanimous that most revival converts remain in the church. The number depends upon the character of the revival, the care received afterwards, and whether or not it was necessary to let down the bars to allow them to come in. Some hold that every impulse the church ever received came through the medium of a revival.

14. As to the most frequent age of conversion, no distinction was made between men and women. As a general result, the answers given are at the average age of about 17 years.

15. Men seldom tell their real objections to uniting with the church. Those which they give are mostly evasions.

16. The most common objections encountered are "there are too many hypocrites in the church," and "I can live as good a life outside as many do in the church."

THE PSYCHOANALYTICAL METHOD APPLIED TO THE STUDY OF REPRESSION

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IT is generally agreed among those who have studied the psychoneuroses with the psychoanalytical method, that the symptoms; in fact the disease itself, is caused by a conflict between two desires. The symptoms are found to be the resultant of two opposing forces; "compromise formations."

One of these opposed forces, the one repressed, has been shown to be a sexual desire or need. But this one force, no matter what its strength, cannot by itself produce a psychoneurosis. As Freud says: "The sexual need or privation is merely one of the factors playing a part in the mechanism of the neurosis, and if it alone existed the result would not be a disease but a dissipation. The other equally indispensable factor, which one is only too ready to forget, is the sexual repugnance of neurotics, their inability to love: it is that psychic feature which I have designated as 'repression.' It is only from the conflict between the *two* strivings that the neurotic malady originates." . . .

Such being the case it is obvious that for a complete understanding of the neuroses, both of these conflicting desires or forces should be thoroughly investigated.

But this apparently has not been done. It is true we have very widely studied one of these forces, the one repressed, but we have been "only too ready to forget" the other, the repressing force.

If a ballistic expert, in studying the flight of projectiles, should fail to consider the propelling force, except to acknowledge that there was such a force, we would not credit him with any thorough knowledge of trajectories; however thoroughly and extensively he had studied the force of gravity. Furthermore, we would be astounded at his oversight.

Is it not equally astonishing that the psychoanalyst, while making a very extensive study of the repressed affections, has shown no interest in the repression?

It is true we have been *told* that repression is due to: "finer feelings," "ethical principles," "better self," "fear morality," "herd

nstinct," and "conscious standards of morality and propriety." But these statements, as to the nature of repression, are not based on a psychoanalytical study of the subject; they are mere assumptions, rationalizations, phantasy formations.

Why have psychoanalysts avoided the study of repression? Could it be due to their own resistances?

Freud says: "It is not the discovery and counting and tabulating of complexes that is the object of psychoanalysis but the sole object of psychoanalysis is the overcoming of the patient's resistances."

But certainly we cannot effectually overcome the patient's resistance if we are totally ignorant of its nature and source. We cannot hope to fully understand "compromise formations" by studying but one of the two conflicting forces; nor can we claim more than a fragmentary knowledge of the psychoneuroses if totally ignorant of one of the two constituent parts.

I maintain that no analysis or treatment is finished, no recovery is complete when the repression and the resistances have not been analyzed by the so called free association method.

In the treatment of psychoneurotic patients I have found it necessary, before satisfactory results could be obtained in the most severe cases, to resort to an analysis of their repression. My observations have been not only astonishing, but of the utmost importance from the therapeutic standpoint.

It is the purpose of this paper to briefly recount these observations.

During the analysis the patient invariably discovers that the symptoms serve as a gratification of sexual desires which he keeps out of his conscious mind. After this has been demonstrated by the analysis, the patient is asked why he keeps these desires out of conscious mind. He promptly assures the analyst that he does so because such desires are wrong and naturally disgusting or perhaps that they are unacceptable to his "conscious standards of morality and propriety; that they are too horrible to think about."

But when he is induced to hold the question in mind; "why do I keep these desires out of mind" and to passively observe all the thoughts that occur to him, it usually happens that some incident of early childhood comes to his mind, when he pleasurably performed some childish sexual act and was made to feel that he displeased some one by so doing. Often this is but a secondary event but similar in several ways to the original efficacious moment, and constitutes a secondary cause of repression.

As the analysis is continued, however, it eventually appears that quite early in childhood the patient pleasurably performed some sexual act for which the beloved parent showed displeasure.

The nature of this pleasurably performed sexual act varies with different patients; but the desire gratified is always one of those designated by Freud as "polymorphous perverse." In more than one instance I was astonished to find that this pleasurably performed sexual act of the primary trauma was taking the mother's nipple in the mouth. The mother's method of weaning the child actually starting the repression as she shamed, punished and showed displeasure for the child's desire to nurse. Upon analysis it has been regularly found that in these instances, nursing was a sexual pleasure and consequently the child gained the impression that the mother did not want it to have sexual desires or pleasures.

On further analysis it appeared that *to please the mother*, the child wished to have no such desire. *Keeping the desire out of mind (repressing) was to the child tantamount to having no desire.* In other words the child repressed to please the parent towards whom it had a polymorphous perverse sexual desire.

When the patient is asked to think why he wishes to please the parent and to passively observe the thoughts that come to him he discovers that *he gets a pleasure out of doing so.*

It is now apparent that the patient keeps sexual desires out of his mind (represses) to please the parent and thereby secure a pleasure. The process of repression is thus shown to be pleasurable which not only explains its persistence but makes the phenomena of resistance quite intelligible as efforts to retain the pleasure he gets from repressing.

It remains to analyze this pleasure; to discover what desire is thus gratified. When this has been done it has invariably been found that *it is a sexual desire towards the parent that is gratified in thus keeping sexual desires out of mind. In other words repression is a sexual act and gratifies a sexual desire towards one or both parents; usually the mother.*

It has further been found that repression is not one single act occurring in childhood but that this putting-out-of-mind, this not-realizing, occurs repeatedly throughout the life of the neurotic; each time he subconsciously feels that he is pleasing the parent and hence obtains a sexual gratification thereby.

To be sure the tendency to repress is strengthened by many other influences occurring throughout the life of the patient. Among

these we may mention certain religious teachings and evidences of disgust for sexual actions shown by the parent or by other persons towards whom the patient has a positive transference. But these are secondary causes.

From analyses and observations made on normal or nearly normal persons I have found that a desire-to-please-the-parent is invariably present in their childhood, and that they, as well as the neurotic, obtained sexual pleasure from the gratification of this desire. Consequently I conclude that this is a normal component of the infantile sexual constitution and doubtless should be included with those designated by Freud as polymorphous perverse. In the case of normal persons, however, the parent did very little or nothing to give the child the impression that doing no sexual act or having no sexual desire would win parental approval and esteem; consequently the normal child gratified its sexual desire to please the parent by being obedient and by adopting other parental emotional attitudes; not by repressing.

From these observations I conclude that repression is a specific and harmful way of gratifying one of the normal, infantile sexual desires.

On account of the great amount of space which would be required it is impracticable for me to include in this paper one of the ten complete analyses from which my observations and conclusions have been made. Instead I give, verbatim, a written account of the origin of his repression which was recently handed to me by one of my patients. It should be borne in mind that the insight and realization shown in this account *was made possible only by much analysis.*

"While it seemed improbable that my association with my mother had anything to do with the beginning of repression I have found that it was the complete origin of it all. The active element is the sexual desire which very early was directed towards my mother, pleasure and gratification being derived by being petted and fondled by her and in doing things which gave her pleasure and raised me in her esteem. These desires I can identify as being sexual. There is nothing about that condition so far to cause conflict however. Where the conflict comes in is at the point that my mother gave me evidence that she disapproved of my gratifying a sexual desire (such as the desire to nurse, to play with my sexual organs, etc.), or having such a desire. This was the first opposition and the result was, not an abatement of the desire, but an attempt to abate the desire. By my mother's actions I was led to think that she would not tolerate evidence that I was gratifying a sexual desire, and my sexual desire was to please her, therefore in order to gratify my desire to please her I felt that I must try not to have

any sexual desires. The result of this trying not to have any sexual desire (its own motive, however, being sexual desire) was of course not a cessation of the desire but my refusal to recognize its existence, the result being its conversion into such forms and activities as would conceal its identity.

"The thing of importance discovered is that the thing actively back of the repression and acting as its driving force is the (sexual) desire not to have sexual desires, and that just as I would derive pleasure and sexual gratification out of being gallant to my mother and gaining her approbation by doing something which would please her and hence win me favor in her eyes, so did I gain pleasure and gratification out of trying not to have any sexual desires. The sine qua non circumstance was of course that my mother had repression which caused her to indicate to me that it would be pleasing to her for me to repress sexual desires. This is the same desire which is causing the trouble now, that is, I am still trying, so to speak, to please my mother by repressing and getting my gratification in that way, and you may be sure I am anxious to exchange it for another kind.

"The prohibition of the censor was imposed through my early method of gratifying my desire, that is, in pleasing (supposedly) my mother by repressing. I must admit that the nature of the censorship is better understood than formerly, I censored because it gave me pleasure and gratification to censor under the circumstances. In fact the gratification consisted of putting the desire out of consciousness as a result of my effort not to have any sexual desire. This is rather awkwardly put but I believe that you will be able to get me.

"This last analysis which I worked on most of the time yesterday, had the effect of being somewhat discouraging, making me realize that I have been all the time addicted to the same form of childish gratification that I practised as a result of the wrong conclusion I formed very early. It seems that my repression had been keeping me from realizing that fact. I will follow it up with more work and correlation."

As a summary I offer the following formulæ:

(1) Repression serves as a gratification of a sexual desire towards the parent and represents a part of the sexual life of the individual.

(2) Repression gratifies the sexual desire to please the parent.

(3) The desire to please the parent is a normal component of the infantile sexual constitution.

(4) Repression is a specific, pathogenic method of gratifying a normal infantile sexual desire.

(5) Resistance is an effort to retain the sexual pleasure derived from repressing.

(6) The psychoneurotic symptom results as a compromise between two conflicting sexual desires and gratifies both.

As patients invariably show great resistance towards the realization that repression is a sexual gratification; as such realization is possible only near the completion of an analysis; I anticipate that my observations and conclusions will give offence to some psychopathologists. That psychoanalysts have so persistently avoided the study of repression is inexplicable to me unless it is largely due to their own resistance. Consequently the usual phenomena of resistance, viz.: theoretical objections based on subconscious feelings, criticism of the analyst (writer) or the method used, and a tendency to minimize the importance of the observations are to be expected from those who get pleasure out of not realizing.

I hope, however, that the presentation of these observations will induce further investigation of repression *by the free association method* whereby enough data may be obtained to determine if my findings, in ten consecutive cases, are exceptional, or if, as I strongly suspect, they are universally present and constitute the invariable mechanisms of repression.

THE FEAR OF ACTION[1]

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MR. PRESIDENT, MY DEAR COLLEAGUES:

Nothing could be more agreeable and more profitable for an author than to expound his own ideas before colleagues who are at once foreigners and friends. The different viewpoints in which one places himself in different countries permit one to see facts under a new aspect and to understand them better. Unhappily, I do not speak the English language well and I understand it even less; so I must limit myself to indicating briefly the manner in which I propose to group and interpret a certain number of mental troubles which are observed often among neurotics. I hope to be able to study at leisure your critical comments when they shall have been published.

I

A well known fact of common occurrence in the course of neuroses consists in a fear which the subjects manifest concerning objects of great variety or attaching to divers situations. Very well known is the phobia of cutting tools or sharp objects, the phobia of churches, of religious objects such as fragments of the Host, the phobia of unclean objects, the phobia of public places, agora-phobia, erythro phobia or the fear of blushing before some one, etc. — One cannot exhaust these innumerable phobias. I have had occasion to show in my first studies that the localization of fear upon this or that object was purely apparent; it is only secondarily and by a sort of error that the patient imagines that he is afraid of the edged tool, or of the filthy object or the public place. If we begin with the very distinct group of professional phobias as in the fear of the razor which occurs in barbers, in the fear of scissors which occurs in seamstresses, in the fear of medical prescriptions which occurs among physicians, there is found at bottom the fear of having to perform one's trade or the fear of the professional act. In the phobia of bells, of church bells, of the altar, or of fragments of the Host there is the fear of having to perform religious acts.

[1] A paper read in French at the Atlantic City meeting of the American Psychopathological Society, June, 1921. Translated by Lydiard H. Horton.

In the phobias of filth, in all the phobias of contact there is the fear of an act of practical life, the fear to be obliged to keep house, to do cleaning, to take care of the sick. In the agora-phobias as in the erythro-phobias or in the phobias of deformities or of ridicule there is not precisely the fear of a situation. There is the fear of the act that one would feel called upon to perform in this situation. The fear of blushing like the fear of exhibiting deformity or a ridiculous aspect of oneself, are varieties of pathological timidity, of the fear to be obliged to show oneself, to speak to others, to expose oneself to social judgments; it is, as I used so often to say, a disturbance in the action of facing *social appraisal.*

Without unduly dwelling on one of my investigations which is already ancient, and which appears to me scarcely open to dispute, we can admit here that the phobias of diverse objects or divers situations are at bottom phobias of action which are provoked or called forth by these objects and these situations. In many cases the patient has insight into this fact himself and he designates this aspect of the phobias by saying that he has fear of eating, of speaking, of walking, or of working. In the most common phobias the fear of fatigue signalizes the appearance of the mental agitation at the beginning of the greater part of the actions in question and the patient knows very well that he is afraid of taking action. One of the difficulties which we meet in the study of mental derangements, sickness of the mind, is that the language of the patient carries us away in numerous directions of thought, while the mental processes which transpire in such a variety of ways prove to be at bottom about the same. Historically speaking, the symptoms of the various phobias, of the different manias or obsessions were at the start innumerable; but they reduced themselves little by little to a very small number of phenomena of which they constitute the varieties or combinations. There are a great number of other symptoms apparently differing from phobias which are nevertheless identical with these phenomena and which we must classify with the fear of action.

Nothing is more common that the discontent which patients experience with regard to their own behavior, than the criticisms that they make of their own actions; some claim they have lost all their initiative, that they have not enough will, that they are too much managed, too much under the suggestion of others. Others repeat that their action has lost its moral character, its elevation, that they are selfish, indifferent toward others or else that they have lost their

grace, their ease of manner, that they appear ridiculous, stiff as mannequins, that they have become un-aristocratic. In fine the greater part bewail the fact that their action is not to the point, not complete, that something is missing, that other people are too quick for them, that they would like to slow down the busy world in order not to be always behind hand.

All these sentiments of insufficiency regarding their own action serve to determine highly varied reactions. The patients who are ill-satisfied with their action watch themselves and by dint of observations, through anxiety about themselves, they fall into a sort of perpetual auto-analysis. They become psychologists; which is in its way a disease of the mind.

They devise precautions to be taken, as a means to perfect the insufficiency of their acts. They slow down activity, they render it interminable, complicating it by all sorts of formulas or formalities, and especially by beginning all over again, *ad infinitum*. How many a young girl considers all day long and all night the length of her undergarment or the proper position of her feet for fear of a lack of decorum? How many patients count pins for fear that some might have fallen into the soup, or verify the position of objects for fear of having misplaced them, lest they should fall on heads of passers-by? These subjects resist all counsels, all orders, even the simplest, in order to get to the point of acting on their own hook to give proof of initiative. Others on the contrary, do not wish to disturb themselves when alone and await minute directions for the least movement in order to avoid all share of responsibility in the acts which they think they are incapable of executing correctly.

Well, all these sentiments and all these reactions depend in sum upon one single phenomenon; it is that the act in question appears abnormal, that it has annexed to itself a difficulty and a particular peril. The patients who have these retardations, this meticulous habit of verification, of beginning over again when executing any action in particular, before long cease to perform the action in question and in the end they manifest fear for the objects or the situations which have relation to these activities. They may have started with manias for this or that kind of activity but they end up with phobias, for at bottom these are phenomena of the same stripe, involving fear in the domain of executive action. At most one might say that the fears of action manifested by the "manias of action" or of beginning over again, are a little bit less marked than those fears of action which enter

in the true phobias. It may be regarded as the inferior degree of fear of action, that is, the *anxiety* of action.

II

When we go one step beyond here we come upon a group of sentiments and obsessions which seem strange and varied and yet which are of the same category. The patient of whom I spoke in Boston at the Meeting of the American Medico-Psychological Association and whom I designated under the name of Sophie is not always in the state of grand delirium. She has moments of lucidity during which I am able to persuade her to walk in the garden and to talk somewhat reasonably. She hesitates in her actions, she stops short and wails instead of acting brusquely and rapidly as she did in the observed activities of her delirium. When she thus stops short she is upset by fears and remorse of the strangest kind. "No, I should not have done that, it is precisely these few steps in this alley-way which were forbidden to me by Heaven. I give you death if I walk with you. . . . I insult my mother if I eat as you desire. . . . I am causing my father to suffer in his grave if I look on his photograph. . . . I become a hideous monster if I speak to you. . . ." Each action that is planned in its correct form by the patient or undertaken with any self-consciousness or even a little reflection presents itself with an appearance so strange and so odious that it awakens a thought of the most forbidden actions even to the degree of sacrilege. Do not suppose that this behavior is rare.

I could present to you at least fifty cases quite analogous. I will recall to your mind only the observations of a man of 49 years of age whom I have often studied. This patient is interesting because he has full realization of the absurdity of such thoughts, and because he laughs at them and because he tries to explain them on his own hook.

"I cannot," says he, "perform a single new activity without representing to myself that it is going to entail diabolical consequences. If I buy new shirts it seems as if I were preparing for the assassination of my two children. If I rent an apartment it is only in order that I may place under the big entrance door the coffin of my wife where it will rest very nicely; I have selected this apartment (it would seem) only because of the convenience which this entrance way presents for the coffin of my wife. If I open this book it is with the idea that I am preparing a cataclysm which will involve the whole city of Paris. All this frightens me so that I take back my recent purchase of shirts

with the excuse that they do not fit; I give up the apartment, and I close the book."

A young man of thirty years of age who is a good musician is obliged to give up sometimes for six months, sometimes for a year the playing of his violin; for at such times he cannot touch the instrument without being overwhelmed by the conviction that he is playing in a manner to set Almighty God on edge.

A variant of this sentiment consists in replacing the sacrilegious character (as against God and religion) by characteristics of ugliness, of vulgarity, of uncleanliness in conflict with artistic sensibility and good breeding. "Everything that I put my finger on is ugly and dirty; flowers become faded as soon as I look upon them. If I come to love a woman she becomes ugly and unclean, monstrous, and I am crushed by the very weight of this impression. . . . Any man whom I can care for becomes an untidy janitor reeking with alcohol. I cannot wish for anything but that it becomes repugnant to me at the same time." In the most common and pragmatically important form of such phenomena, that which gives rise to the common conceptions of scrupulosity, the degradation of the act in question is an ethical or moral one. Every activity which the subject is in the course of performing and which he is about to accomplish, or even to think of accomplishing presents itself in an aspect that is morally blameworthy or even criminal. "It seems that I am offending against ethics when I prepare the soup. . . . I am flaunting morality when I put on my dress. . . . I am always doing forbidden things. . . . This book must indeed be very immoral, since when I read it I always have the feeling that I am reading surreptitiously one of those books which I was forbidden to open at boarding school. Is it that I have not paid for my breakfast? For in eating it I have the impression of stealing something from poor people." As we can already comprehend from this last phrase, the patients feel obliged to have recourse to analogies and comparisons. They go over mentally all the crimes in the calendar seeking that one which in their fancy should arouse in the perpetrator a sense of repugnance, of culpability, of remorse, corresponding to what is experienced by themselves; thus we hear the victims of this sort of scrupulosity resorting perpetually to the following formula: "It is as if I were putting poison in the soup, pins in the bread, it is as if I were putting loaded bombs in the chimney to blow up the house, it is as if I were making signs to men to come up into my room."

It is always the proper and correct action which the patients wish to perform, but the action presents itself under a coloring which makes it appear sacrilegious, ugly, immoral, and thus the patients become afraid to perform an act which has painted itself in that manner. Things often complicate themselves even more. It is not long before we see the trouble evolve and the observed symptoms become even more peculiar and difficult to interpret. I wish to refer to the "reversal of sentiments," or the "false impulsions," of these victims of scrupulosity. These patients are not disgusted and frightened by the act which they are commencing in reality to perform, but they are made fearful and are slowed down in carrying out the first undertaking by reason of another and quite opposite compulsion toward which they find themselves irresistibly attracted. In a word, for the action which they wish to perform there is substituted an apparently irresistible impulse to do the opposite action. "I feel myself drawn toward the action that is the contrary of the one I desire. I feel as if I wanted to do the opposite of what I wished to do. I cannot make head or tail of it." For example, when in the act of praying, they have an impulsion toward blasphemy, and, like Bunyan of old, they take hold of their chin with both hands in order not to cry out horrible things against the Lord Almighty. A certain mother cannot undertake the toilet of her little child without an irresistible desire to cut him, to boil him in a kettle or drown him in the bath water. One of the most important among these "reversals of sentiment," is that which transforms love into hate. This reversal unless I am very much mistaken, plays a large part in the establishment of the ideas (delire) of persecution. In my last book dealing with Psychological Medicine, I cited several observations where the patients began by having manias and obsessions of love with respect to persons in their own family, and then had compulsions and obsessions of hatred toward that same person. This sort of reversal plays a great part in the supposedly sexual impulsions of this "scrupulous" group of patients.

An interesting patient whom I studied at length in this last particular, and of whom I will speak to you now, and whom I have described under the name of Hermione, is an unfortunate mother of a family sorely tried by the death of her two sons, killed in the war. In her grief she turns with more fervor than before to religion and to good works. She wishes to suppress the bagatelles and trifles of life and to renounce the joys of love which seem unfitting to her age and to

her mourning. She wishes no longer to interest herself so much in her relations with her husband, and forms the resolution of becoming less joyous, less amiable with other men. Puerile resolves, no doubt inspired by grief and entertained by her without suspicion of their danger. Now every time that she goes to a place where there are men, in the drawing room or simply in the tramway, she feels, to begin with, that her attitude is not decorous and she "understands" very soon why this is: because she experiences a violent sexual desire for one of these men. She knows not which. She wishes to provoke him, to touch him. She experiences the Orgasm even in her genitalia and she is horribly oppressed by these sensations and these temptations which she had never experienced before. These inverse impulsions may give rise in certain cases (like that of Sophie of which I spoke to you in Boston) to the actual execution of the antithetical act. Sophie who had a mania of cleanliness ends up in her delirium by reaching the most extreme degree of uncleanliness. In certain "deliria" of persecution the sentiment of hatred which replaces love can become dangerous, but from a practical standpoint the actual carrying out of this sort of impulsion is rare. In order to reach this extreme it is a first condition that the patient should have become deteriorated to a considerable degree of inferiority and that he should crystallize into some concrete form of resentment the obsessions which were developed — by whatsoever psychic mechanism — at the higher intellectual level. Most commonly then, these supposed impulsions are in no way carried out; they remain simply obsessions which rise at every occasion as soon as the patient wishes to carry on some proper activity. Nevertheless, it is difficult to understand the genesis of this contrariness which, the patients contend, impels them to desire the action opposed to their real wish. Still, we can conceive of various mechanisms which are analogous to this transformation. When one is struggling valiantly against one's enemy, one considers him to be powerful according to the amount of effort one is expending against him. These patients, who are preparing heroic struggles against their concupiscence, not unnaturally imagine that they have, at the start, a marvelous degree of lust to overcome. To express the matter differently, the patient is in (exaggerated) fear of what he may do; he steps aside from the (innocent) act in question and recoils from it as far as possible — right over to the opposite extreme. In final analysis the patient has likened his own (proper) act to some crime. Then as he continues to desire the original act it follows that his

desire extends also to the crime. This still comes under the formula of the transformation of the act, or wish for it, under the influence of the fear of the act, whereby the harmless act takes on the most terrifying form, namely of the extreme opposite.

However that may be, these divers sentiments of sacrilege, of immorality, of temptation to conflict with each other, bring about defense reactions all the more violent as the fear becomes greater. Hence the patients impose upon themselves sanctions in the form of compacts, reparations, covenants. But a more serious symptom at this point, is the wish to suppress the activity which offers itself under an aspect so distasteful. This entails two species of outcome according as the patient wishes to suppress the first act which is the innocent one, or whether he wishes to express the second antithetical act toward which he feels himself so violently impelled. The patient struggles against either one or the other, he makes desperate resistance against those who seek to make him accomplish an action. Sometimes the situation is even more strange and the patient not only suppresses acts of his own, but wishes equally to oppose the activities of others. I have described in one instance a most unhappy family in which it was impossible to eat at meals anything but bread and cheese because the young girl forbade all cooking and lighting of the fire. The conduct of the patient may become more and more disturbed, not only by the growing constraint and incapacity for action, but also by active opposition and resistance to specific activities. The repression (*refoulement*) of action which plays a considerable rôle in these disturbances is not at all an expression of moral habits, nor is it the starting point of the trouble. It is itself a consequence of the disturbance in the power of action and a manifestation of what we have called the fear of action.

III

Can we not broadly survey these facts and seek to comprehend this fear, this repulsion in the presence of the tendency to perform an action, at the moment it begins to activate itself. Now this commencement of the activation of a tendency gives rise in the normal man to the sentiment which we call the desire of fulfillment. Why then should something else develop in the form of a fear in place of that desire? To understand this peculiarity we must remember that the alteration of the emotional tone of the given action, or the sentiment which accompanies the activity, depends upon the energy and

upon the psychological tension with which we accomplish the action.

In a normal activity the strength or energy mobilized to fulfill the tendency is sufficient and even superabundant; thus the action can be accomplished even under the most uneconomical use of one's superior powers and still there remain unexpended sources of energy which overflow into outside channels and enhance the sense of ultimate achievement. That is what we refer to as the sentiment of triumph and as the joy which accompanies well-performed action. This sentiment of satisfaction concerning the performance of an act exists from the very beginning of the act. For the first preparation of the tendency to action, which I have called the setting up of the tendency, takes a form that is enjoyable and which is in the nature of the state called interest. The commencement of the activation (which is the stage at which the action takes on a form sufficiently characteristic to be consciously recognized) is linked to an anticipation of the enjoyment which the act will procure; in other words this is a desire. Finally the elaboration of the act, even if it is difficult and demands an effort, brings about the hope of success and the assurance of accomplishment. At all these stages of the activity there is a favorable emotional tone. If the force which remains at the disposal of the tendency in question becomes lowered considerably, and is a residue only just sufficient to defray the costs of performance of the higher levels of behavior, but without superabundance, without advantageous outflow toward other tendencies, without bonuses, as it were, the act may still be normal in appearance; but there is no sense of triumph, no interest, no desire, and no passion of accomplishment. The performance of the act will be a drab and indifferent affair.

Suppose finally that the forces at the disposal of a given tendency be frankly insufficient; the activity will then be executed with parsimony with a sort of avarice and it will take on very distinctive features. The superior degrees of the activity will not be attained, nor will the patient reach any degree of reflectiveness or rationality; it will be necessary that the performance take the form of a simple act of will, without intermediaries possibly under the form of a mere perception or reflex action. Now it happens that an act of this character, in the case of a man accustomed to what I call the superior forms of activity, is as painful as to lie upon the bare ground when one is used to a good bed. An act which has completely lost the quality of reflectiveness loses the essential earmark of security to which we are accustomed.

It is as if we were required to walk on dangerous ground with the eyes closed. What is more, this act strains our resources, depletes the stock of resources allotted to the other tendencies and other activities, thus compelling us to restrict the sphere of activities which we otherwise could carry out in their superior form with a little reflection and reasoning. In other words an act of this sort which exceeds at a given moment the resources of our spirit, brings into prominence our poverty of mind, and exposes us to further miseries.

It is as if the mentality were required to possess a certain fortune. There are such things as psychic riches and mental wealth and both psychologists and physicians must know how to determine the assets of a mind. Well, in the case which we are now considering, the credit balance is very bad and the mind is up against bankruptcy. The mind is afraid of this bankruptcy more than of the loss of a material fortune; so an act of any sort which can precipitate our final bankruptcy provokes a movement of recoil and a reaction of defence.

Is it exact to say that the action in question presents itself under the aspect of danger and of pain? Not precisely, for the actions which are painful or dangerous are normal performances which we have sometimes accomplished successfully. It follows that the act under consideration is one which one would not, normally, have accomplished, inasmuch as one has not already gone through complete bankruptcy; thus the contemplated act is bereft of normality and seems strange and fearful, without, however, the patient being able to lay hold of any exact reason for so regarding it. It is at this moment that there arises the flood of comparisons, of metaphors that figures so largely in the expression of the sentiments aroused by the act, which has come to be extraordinarily odious, sacrilegious, vile, criminal, or contradictory, and which thereby gives birth to all the reactions of repulsion and to all the delirious interpretations.

In sum, I am disposed to believe that in all these curious disturbances we are always concerned with mere depressions of activity, more or less profound, either involving the mind as a whole, or bearing down upon some one tendency or group of tendencies. The energy of performance being diminished but more especially the tensional level being lowered, the process of activation can no longer attain to the superior forms of behavior. In order to give study to this interpretation it would be necessary to analyze more fully the individuals who present these fears of action; we should observe their sentiments with due regard to the accompanying signs of psychological depression.

We should take heed of the fact that the phobia of action does not make its appearance in the most inferior type of mental activation, as in the *délire psychasthénique*, but that such fears are manifested only when the subject is seeking to energize his performance under its higher form; thus, acting at a level of expenditure too costly for his budget of available resources. Likewise, we should ascertain the conditions under which these phobias of activity appear as a sequel of exhaustive states following that fatigue and those emotions which undermine one's psychological prosperity and depress the tensional level of the mind. A further step would be to gather all data as to whether the fear of activity and all the disturbances that flow therefrom can be made to disappear by means of repose, by hygienic measures, by all the stimulating procedures that aim to replenish the wealth of mental resources.

We here enter upon such protracted studies that it must suffice me to have indicated to you my own interpretation. This has the advantage of bringing into unity a number of scattered phenomena and of pointing out a path for fertile investigations.

SOME NOTES ON THE STAMMERING PROBLEM

BY RALPH REED, M. D.
CINCINNATI, O.

EARLY in my work in the field of psychoanalysis, I felt that if a few stammerers were studied intensively by the psychoanalytic method, the solution of the nature of this difficulty would be readily arrived at. I still believe that psychoanalysis will answer many questions with regard to stammering, but I do not believe that it solves the problem of this disorder in anything like the complete and clean-cut way in which it has succeeded in solving the problem of many of the other psychoneuroses.

I have now investigated in greater or less psychoanalytic detail, some twenty cases of stammering. The most striking thing that to me was elucidated, was the fact that a series of stammerers will eventually contradict almost every theory that has ever been set forth, with regard to the nature of this disease. I believe that there have been more absurd and illy digested theories of stammering set forth, than with respect to almost any other psychoneurotic disorder. I studied Bleumel's *Stammering and Cognate Defects of Speech*, very carefully years ago, and found nothing in it of any value to me whatever. I can say the same of practically every theory of this disease that has been since advanced, including the work of both Swift and Scripture. I am unable to find that stammerers invariably possess what has been described as the stammering monotone or that their auditory memory or power of visualization is defective or that they were born left-handed and had been trained to use the right, etc. The best summary of the stammering problem, I have yet seen, is Coriat's *Stammering as a Psychoneurosis* (The Journal of Abnormal Psychology, February-March, 1915).

Every stammerer certainly suffers in some degree or other from an inferiority complex, but to say this is not saying much. The mere discovery and confrontation of the patient with his inferiority complex will accomplish but little. Sometimes this seems to be the result of the stammering alone, or again it rests upon unconscious fixations that it is the duty of the psychoanalyst to unearth. Not every stammerer has been teased or made to feel humiliated by his defect; at least I have seen several who have insisted that they never suffered in this way.

A few other facts with regard to stammering that are infrequently, if ever mentioned, may be of some interest here. Stammering does not invariably begin after the age of five or six. I saw one case in a child of three who had stammered persistently ever since she began to talk. Stammering constantly tends toward spontaneous recovery;[1] one rarely sees a stammerer older than thirty or forty; it is essentially a disease of adolescence. I have never yet seen a stammerer who invariably stammered on a limited and definite number of consonants, or as some prefer, vowels. A stammerer may stammer on any word or at any time. As most every one knows, stammering varies greatly on different days, even from one hour to another, but I have noted the peculiar fact that there are often certain subjunctive clauses coming in the course of a stammerer's conversation, which are spoken easily and readily. The cause of this will be later commented upon. I have not even found that a stammerer will constantly speak worse to strangers and better to friends, worse away from home and better at home, or vice versa, yet the intensity of the stammering seems to vary in the most unusual and extraordinary ways. Another point may be of interest here, as having a bearing upon what I shall later say as to the causation of stammering, and that is; if at the time of speaking an effort is required of the stammerer in some other direction than speech, he will usually speak better. If, in reading, the attention can be partially directed away from the word or phrase immediately being read, he is much more likely to read it without stammering. This is one secret of the improvement secured by stammering schools that inculcate a change of voice tone or rhythm. The attention of the stammerer is merely diverted to some extent from the essence of speech, to some secondary factor.

Of course, most stammerers can sing and speak to rhythm. I have more than once, on the first interview, considerably impressed patients by asking them to talk with the rhythm of a metronome. Frequently this is a discovery to them, as they had not previously known this to be possible. But as some one has aptly put it; the stammerer cannot go about for the rest of his life, beating time to his conversation. I may say that I have tried various methods of correcting stammering by rhythm, change of modulation, etc., and nothing now remains except to condemn them one and all, absolutely and com-

[1] Individuals who have stammered will usually rationalize their recovery. They attribute it to one factor or another, sometimes their own "will power." I believe that actual attainment in other directions has the most important influence.

pletely. It may be well enough to remark here that in my opinion, the one thing to avoid in treating the stammerer, is the directing of his attention in any way whatever, to his speech per se.

After all, there does not seem to me to be any profound mystery in the stammering problem. Of course, as every one knows, the stammerer can speak as well as any one else, as is evidenced by the fact that very frequently he does speak with ease and fluency. Stammering is not essentially a speech defect at all, any more than writer's cramp constitutes an essential deficiency in the ability to write. The only reason that the stammerer does not recover with the same readiness that the victim of writer's cramp recovers, is because he cannot, as the patient with writer's cramp can, forego the effort to speak for a sufficiently long period of time to give him the opportunity of regaining his speech confidence. But this is not to say that stammering is alone a mere habit fear. It is very much that, to be sure, but it is also a true anxiety neurosis, dependent upon a complex group of unconscious factors.

The essential physical mechanism of stammering, I believe, is nothing more than an undue amount of energy overflowing into the muscles of speech. If I attempt to pick up my pen from the desk, it is obvious that if I do not put sufficient energy into the muscles of the fingers and hand the pen will fall from my grasp. It is equally obvious that if I put forth too much energy the hand will become cramped and something in the nature of a spasm be manifested. The exact amount of energy necessary to speech is much more subtly determined than in grasping an object. The same thing happens in writer's cramp. This also explains why the stammerer frequently can whisper, but cannot speak in an ordinary tone. He simply over-energizes his speech. This is why, if some of this energy can be diverted, he can speak with freedom; and why, with subordinate clauses or inconsequential remarks, he is much more likely to speak with ease; and again why, on talking over the telephone or giving his name, stammering is more pronounced. The more important the thought he desires to utter, naturally the more certain the speech defect manifests itself since he, because of anxiety, directs more energy toward the physical mechanism of speech. [a]

[a] Since writing the above a woman aged 48 has come under my care suffering from a complication of nervous symptoms. She has a marked winking tic. From the age of eight to eleven, her mother informs me, she was a bad stammerer. Her parents "broke" her of the habit. But immediately the tic developed and has remained with her ever since.

As has been previously noted, stammering seems to possess many features in common with writer's cramp, blushing neurosis and other situation phobias. The next related nervous state, to the former, is any excessive reaction in the presence of strangers, in the simplest form, ordinary bashfulness. This frequently is manifested in such an extreme degree as to constitute a true psychoneurosis. We thus see that we can trace a red line of relationship from stammering through several types of psychoneurosis, to the simple bashfulness so commonly observed in children.

Writer's cramp may be regarded as resting upon the same general basis, although I have no doubt that at times it may be traced to some specific inhibition to writing itself. In a recent case I analyzed, I found the following series of incidents that preceded an attack of telegrapher's cramp. I was not consulted for the relief of this condition, as it constituted a bit of ancient history in the case. This man remembered a very vivid dream that he had had during his adolescent years. It showed clearly a marked castration fantasy and after waking, it was some time before he could convince himself that this had not happened to him. Some years later, after an abdominal operation, when he came out from the anesthetic, he thought that his right hand had been amputated and insisted to the nurse that this was the case. She held his hand before his face and attempted to convince him that this was not so, but it was several hours after waking, before he could convince himself. Some time following this, while working as a telegrapher, he fell asleep late one night and had the following dream: He thought that a dog had bitten or scratched a hole clear through the palm of his right hand. He awoke with a marked feeling of anxiety. Thus it can hardly be doubted that the telegrapher's cramp which developed very soon after that, had for its origin a definite right hand association. Thus stammering; writer's cramp; telegrapher's cramp; piano-player's cramp, morbid blushing and even tic, would seem to be related.

However, I do not believe that all cases of writer's or telegrapher's cramp would admit of any such specific analysis, and I believe that we can easily concede that an habitual speech cramp or spasm might have an even more general origin, since speech constitutes a more nearly complete expression of one's whole personality.

Might not any factor tending to produce an inferiority complex or an introverted attitude, favor the production of the stammering psychoneurosis? I have investigated carefully, the ordinary early

possible associations and fixations one might naturally suppose would be productive of stammering and so far, I have been unable to trace any particular stammerer's difficulty to any special incident.

For instance, the chance that stammering represents an inhibition against the utterance of obscene words, or that stammerers as very young children might have been over-corrected on the occasion of an indulgence in obscene language, or have had their mouths washed out with soap and water, etc., — no such incidents have been found in any of my cases. Neither have I found any word association, such as the name of an individual member of the family, or childhood associate connected with sexual incidents productive of types of early neurotic fixation resulting in a tendency to stammer on the same letters with which these names began. But Coriat relates what seems to be a rather convincing case of this sort.

I believe it is difficult to note the continued improvement and cure of stammering, while the patient is under treatment. The simple reason for this seems to be that the treatment itself, because of the very fact that the patient knows that it is being taken for the cure of stammering, draws sufficient attention to speech itself to prevent a recovery.

Speech is largely emotional in origin and essentially automatic, and hence, like other automatic actions, is carried out with the greatest facility when the attention is distracted to something else. We talk best when we are thinking clearly and accurately of what we want to say, rather than when we are confronting ourselves with how it is being said. This is the stammerer's barrier. He can never forget, consciously or unconsciously, what he considers to be the necessity for speech effort. A million associations with speech failure have determined this. Now one or two observations on therapy.

There seems to be a general conspiracy to impress the stammerer with the seriousness of his disability. This, I believe, is a grave mistake. Compared to many other disabilities, even to other psychoneuroses, stammering does not constitute the serious disorder that stammerers are led, in many ways, to believe. One of the first steps in undertaking the treatment of a case of stammering, must therefore be the elimination, as far as this is possible, from the mind of the stammerer of all concern with regard to his speech defect. I usually spend one or two hours on this point alone, in beginning treatment. I always insist that he must not expect an early cure. This, I believe to be very important. If the stammerer is constantly looking for improvement,

to that degree his attention is being constantly directed toward his speech. I tell him that when the treatment is ended, there will probably be no special change whatever to be noted in his speech. It will be readily seen that this is a decided about-face from all so called therapeutic suggestion. In fact I go even further and attempt to assist the stammerer to a state of mind toward his disorder, wherein he becomes *utterly indifferent as to whether he ever recovers or not.* It took a number of failures and merely partial successes, in the treatment of stammering, to bring me radically to this point of view. I attempt to inculcate the idea with the stammerer that his stammering, after all, is of slight consequence, that it troubles him much more than it does any one else and that no matter what calling in life or ambitions he may have, he need not fear that the stammering will interfere in the slightest with their attainment. I cite incidents of men of marked prominence and success, whom I have known, who were stammerers. After a few interviews, my patient is usually able, with a fair degree of success, to accept this point of view and I may say that the attitude of confidence and freedom gained, constitutes in itself a marked relief of his previous feeling of inferiority and distrust of himself.

These preliminary steps having been taken, it next becomes necessary to point out to the patient that the stammering is probably nothing more than merely one symptom of a general neurotic and introverted personality, that should be corrected and that it is this, perhaps as much as the stammering in itself, that has held him back from the attainment of his ambitions. This prepares his mind for the general psychoanalytic investigation that should follow. When this is undertaken, it will actually be found that the stammerer often preserves many types of infantile reaction and that his relationship to some member of his family is not truly normal. I often find an older brother, or sister, or father, or mother who is still dominating the patient to an extreme degree and, therefore, he has never succeeded in attaining complete adult expression, but is still infantile in his feelings and reactions toward the other individual. This usually tends strongly to maintain his general inferiority complex.

With respect to the dominating individual, imitative factors may enter. For instance, in one of my cases, a girl of twenty-two had always been made to feel very inferior to an older, prettier and more socially successful sister. At the same time, all of her ambitions and longings for freedom were markedly restricted by a narrow and puritanical mother, who prevented all self assertion that the older sister

did not prevent, and did all she could to keep this girl a mere child, without initiative or will of her own. The mother had the most intense and rapid manner of speech that I think I have ever listened to.

Although this case had a very intensive analysis, she showed but little improvement until she acquired the strength of will to break, amicably but completely, with her family and accept a position in a city that was as far away as she could get, from the city in which her family resided.

The psychoanalysis having been concluded, the patient is dismissed without further reference to his speech and told to report in six months or a year. By this time, new adjustments should have been effected and a definite improvement is usually to be noted. The patient has ordinarily lost all interest in his speech disability and is not tempted to further efforts at cure, such as the patronizing of advertising stammering schools or other psychological quackery.

Thus the conclusion of the whole matter, to my mind, is simply that the problem of stammering will admit of no special solution, but must be worked out on the basis of each individual case; with special reference to the thought that all attention directed toward the speech mechanism in itself is definitely contra-indicated. This at least eliminates one hundred and one foolish and futile theories of stammering therapy.

THE MECHANISTIC FEATURES IN THE DREAM PROCESS*

BY LYDIARD H. HORTON

THE recent unusual increase in the literature of dreams suggests to me that it would be apposite to summarize the mechanistic theory of dreams contained in a series of my papers published in THE JOURNAL OF ABNORMAL PSYCHOLOGY from 1914 to 1920.

A glance at the history of psychotherapy in this country would explain somewhat the vogue of the *symbological* explanations of the dream imported from central Europe.

The decade from 1910 to 1920 has witnessed the expansion of the Psychoanalytic Movement in America. It need hardly be said that this movement is essentially a therapeutic one and that it took up the functions in America which had hitherto been associated with the Emmanuel movement, with New Thought and more broadly speaking with Christian Science. Psychoanalysis differed from these other movements in the vast body of scientific doctrine, or (as some would have it) dogma, with which it surrounded the practical workings of the psychoanalytic method. As a matter of fact it has been felt by those who are familiar with the history of psychotherapy and the beginning of modern psychologic analysis (in connection with Charcot, Janet and Prince) that the scientific pretensions of psychoanalysts were alluring but that they could not stand up to logical criticism. Indeed it has been said of Psychoanalysis — in its trademarked sense — that it is essentially psychologic analysis with the logic left out. Certainly the nature of the movement as an art of healing did not favor a strict adherence to those principles of scientific experiment and demonstration which at present restrain the spirit of mere speculation in the psychological departments of our universities, and act as a wholesome repression upon the claims of mental healers to be called scientists.

Conversely, by the very fact of the universities frowning upon the offerings of psychoanalytic enthusiasts there was an actual halt in the effort of making truly scientific studies of the dream process; and I recall the time when it was thought that studies of any depth into the dream were premature, not to say somewhat *infra dignitate*.

It was under these circumstances that it occurred to me and to a

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number of my associates, that something like a standardization of the subject of dream investigation would be desirable. For this standardization we already had a certain background, not necessary to go into here.[1]

The outcome was the formulation of the Dream Analysis Record, of which the first four pages were published in 1914. The use of these blank forms since 1911 has exceeded the expectations entertained at the start and has served to bring to light a number of mechanisms in dreams that had hitherto not been noticed by any writers, including the prolific psychoanalysts of the Vienna and Zurich schools.

It seems desirable to give in succinct and almost telegraphic form a statement on the nature of inventorial technique and to mention similarly some of the fruits which it has yielded in regard to a mechanistic conception of dreaming and of similar thought processes.

NATURE OF THE INVENTORIAL TECHNIQUE

The making of an inventory is a simple but careful process of carving up the dream narrative and re-forming it into convenient units. These are formed with a view to carrying on the familiar free association experiment. Fixed units so constituted are maintained throughout the experimental investigation of the dream and the success or lack of success in interpreting the dream is to be measured with due reference to the units originally set down as items to be accounted for. Thus, at the start, we have some indication as to what there is to be done, and some way of measuring what has been accomplished, by counting individual items of set number and character.

In a word, the dream inventory or the inventorial technique is nothing more than a systematic and clean-cut enumeration of the principal elements entering into a given dream phantasy. When we say that it is a clean-cut enumeration, it is relevant to explain that this quality is secured largely by making the inventory something more than a mere catalog. It is, in addition, a classification of the elements of the dream.[2]

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[1] In the first place a psychological analysis of the mechanisms of wit and humor and other products exhibited in Lewis Carroll's immortal work "Alice in Wonderland"; and besides certain investigations of my own in the psychotechnical use of blank forms of report as a means of fortifying the exactitude of method in industrial management.

[2] Statements to this effect, as well as full illustrations as to method of making inventory, were published in JOURNAL OF ABNORMAL PSYCHOLOGY for February-March, 1914, pages 394–404.

FINDINGS OBTAINED BY INVENTORIAL TECHNIQUE

A result of an extensive use of this dream inventory was to show the untenability of the doctrine of symbolism, that is to say, the impossibility of regarding the dream as made up of expressions or utterances of "the Unconscious." There is no "language of dreams" in any true sense. For it was found there was no such constant one-to-one correspondence between latent content of a dream and the images made manifest in consciousness. On the contrary, it was found that there was every degree of variability as between meaning and alleged "symbol" that imagination could conceive. It was found also that psychoanalysts' acknowledgments of this state of affairs were highly inadequate. Far from there being any fast relation deserving to be characterized as symbolism, it was found that very seldom does a given dreamer evoke the same mental imagery in consciousness as an expression of the underlying thought. It was hopeless to attempt even a modification of the Freudian doctrines of Symbolism and Censorship. It was necessary, therefore, to proceed as if the psychoanalytic theories had never been formulated — save that unfortunately it is constantly necessary to pay one's respect, or lack of respect, to dogmatic assertions of psychoanalysts concerning the alleged constancy of certain "symbols" in dreams.

It was found that the Freudian theories were adequate for a limited class of dreams, in which there happened to be a trend of infantile reminiscence and disguised sexual phantasy. As stated in THE JOURNAL OF ABNORMAL PSYCHOLOGY (February-March, 1916), they fail to reveal the inner nature of other kinds of dreams or the *modus operandi* of dreaming as a process of thinking.

A new formulation of a mechanistic type was outlined at this time. It took a direction entirely different from that of Freud, as stated in his "Interpretation to Dreams."[3]

Our own development of the interpretation of dreams has been derived from an intensive study of the dreams themselves, and particularly the dreams of normal people. True, the psychoneuroses obtrude themselves into the course of any large collection of dreams, and similarly by mere force of circumstances, we have had to take into

[3] His words may be quoted here in order to indicate the direction from which we have so widely diverged: "I also venture to foretell in what other directions later editions of 'Interpretations of Dreams' in case any should be demanded, will differ from the present one. They will have on the one hand to include selections from the rich material of poetry, myth, usage of language and on the other hand to treat more profoundly the relations of the dream to the neuroses and mental diseases."

account the lapses of speech. But yet, we have not imposed upon our study of dreams the conclusions we might have reached if we had studied merely abnormal cases, nor those conclusions we might so glibly have explained on the basis of selected lapses of everyday life — such as presented by the psychoanalysts.

We have turned away from Folk-lore and Philology to Biology as the only possible corrective of the vagaries of psychoanalytic interpretation.

NATURE OF THE TRIAL AND ERROR THEORY

In other words, we have formed a bio-psychological interpretation of dreams rather than an anthropological one, for we have felt that the foundations of anthropology are still open to reformulation through a more intensive study of the thought processes of Man, and that the dream presents the simplest means of investigating the intimate processes of thinking.

The biological concepts to which we have allied ourselves are those generally referred to in the broad term of Trial and Error, hence the so-called trial and error theory of dreams, which was stated in 1914 at Columbia University at a meeting in honor of Professor Cattell. To him I was indebted for a suggestion that the intensive study of a comparatively limited number of dreams ("the fewer the better") would be more productive and more valid experimentally than the extensive, excursive and discursive studies of psychoanalysts, carried on in connection with their clinical work.

THE TRIAL AND ERROR THEORY OF DREAMS

The trial and error theory is a formulation of principles which describes and accounts for the dream as a process by resorting to the terms familiarly employed in describing the so-called trial and error behavior of animals, now applicable to mental trials and errors, as recently recognized in psychology under the term "trial percepts."[4] Relying upon these existing concepts for outlining the novelties we have observed in given dreams, our theory of trial and error enlarges upon the trial percepts and ad-perceptive errors. This rounding out of the formulation comprises a re-statement of the principle of apperception, a more definite recognition of the working of

[4] Ladd & Woodworth, Elements of Physiological Psychology, page 594.

the "apperceptive mass," and an extension of the concept of time relations of mental processes to explain definite errors. Time inversion, so-called, is explained as due to ad-perceptive lag. Finally, we allow fully for the biologic principle of Varied Reaction as cutting into the process of apperception or recognition of the stimulus.

The absurdities of the dream are interpreted and explained by special methods which show the operation of the specific factors causing the semblance of trial and error. No preconceptions as to content or meaning or transcendental symbols are imported into this purely mechanistic interpretation which accounts for the dream by expanding the concept of trial and error as obtained from biological science. This tracing of the process in biological terms is known as the *reconstitutive method*, in contrast to the so-called reductive method of Freud and the so-called constructive method of Jung. A comparison of the three methods was presented at Columbia University, April, 1915.[5]

THE RECONSTITUTIVE METHOD

In the language of the paper above cited *the reconstitutive method brings into relief the trial and error character of the dream process.* The organism is shown to have attempted physiological resolutions of "persisting and unadjusted stimulus-ideas." Psychologically speaking, the images evoked in the dream are called trial percepts of the stimulus, or of the idea corresponding more or less closely to the latter. Such "stimulus-ideas" are formed by all possible thought links, not through analogy necessarily but through mere contiguity as the case may be.

This brings into view the aspect of "approximation," which we must in turn define.

APPROXIMATIONS

It is to be noted that in the case of dreams emanating from an external stimulus, there is a progressive approximation whereby the images in consciousness partake more and more of the characteristic features of the stimulus. This is tantamount to a progressive *recognition* of the stimulus-idea (correct-idea-of-the-stimulus), which is supposed to underlie the conscious operations, i. e., to be working

[5] Journal of Abnormal Psychology, February–March, 1916, Scientific Method in Interpretation of Dreams, page 25.

subliminally as an integrated whole, while dimly adumbrated in consciousness and recognized in a partial way.[6]

Not only the "adumbrations" to a given stimulus, but even the more remote approximations, are taken into the trial and error theory as a new validation of the conception already broached by Galton, in psychology, under the name of Ante-chamber of Consciousness. It is to be supposed that the approximations in consciousness represent a gradual *rapprochement* to the configuration existing in the ante-chamber of consciousness. Biologically speaking, the correct memory pattern of the reaction is subliminally formed, but the corresponding supraliminal recognition-pattern is not formed except under limitations of *reaction time* and of *interference with recall.*[7] In fine, the dreamer is very much in the position of some one trying to get at a memory that is just below the threshold of conscious recollection — a familiar experience.

The principle of approximations is a provisional one serving to hold in mind the hit-or-miss character of the dreaming consciousness as distinguished from the more accurate subliminal percepts that precede recognition and guide it. It is the most general principle observable in dreams unless we resort to detailed analysis. Its varieties are infinite, ranging from approximation by most exact steps at one extreme, to apparent vagueness or lack of recognition of the underlying stimulus.[8]

DEFLECTION OF STIMULUS

The word stimulus-idea has been employed for temporary expediency to indicate something that lies in the field of mentation or

[6] An example of "adumbration" is the following: — In the so-called Scratch Reflex Dream a series of images is projected into consciousness under the influence of an actual stimulus, namely the scratching of a mouse's paw on the sleeper's ear. The precursory images (microscope and "slide" exhibiting a supposed "specimen") being dictated by remoter associations of the night previous bear an obvious relation to the stimulus; but it is not long before the dream image of the "specimen" becomes metamorphosed into a design that distinctly shadows forth (adumbrates) the characteristic features pertaining to (a) the scratching movements of a small mammal, as commonly diagrammed in the laboratory, and (b) the actual clawmarks or impressions that a mouse's paw would leave on the skin of the ear.

[7] Ladd & Woodworth, Elements of Physiological Psychology; in the chapter on Memory and the Process of Learning, page 584, and paragraph 31, the case of the Subliminal is admirably stated so far as general psychology is concerned: "*A reproductive tendency may lie below the 'threshold of recall'; or, we may speak of some associations as being 'sub-liminal.' The existence of a subliminal association may be shown in several ways: sometimes by a partially correct recall, and sometimes by the feeling of 'being near' a name which is vainly sought for in memory.*"

[8] In certain cases the erroneous apperceptions are observed to form a series of approximations to the correct apprehension of one of the stimulus ideas at a time. In other cases *ad-perceptual* errors may take the form of a blended reaction to two or more cues, more or less perfectly achieved.

unconscious cerebration — a thing waiting to be recognized or apprehended consciously. This is not a theoretical entity but appears to be a real neural pattern (active neurogram), and in any case has to be postulated as an aid in reconstituting the dream. Otherwise, it would be difficult to follow the process of *resolution by trial and error*. The biological definition of the stimulus-idea would be as follows: *It is a particular change of configuration in the contours of the neururgic levels (James) equivalent to mobilizations of particular sets of nerve paths, whereby particular groups of neurones are placed under static tension and prepared for conscious recognition.*

The physiological basis of stimulus ideas is of the order of reflex pathways and would be visible under the microscope except for the fact that such is the complexity of the higher neurone paths that it defies the ordinary methods of "localization" and can thus be "localized" in the brain only diagrammatically. Beyond that, however, we can localize the "experiential regions" very accurately. *Stimulus-idea* is a term that refers to an unquestionable operation in what is sometimes called the Subliminal Mind, the Secondary Self, but for which we prefer the term Automatic Self as indicating the mechanistic nature of the subliminal process in the formation of *stimulus ideas.*

PERCEPTS OF AUTOMATIC SELF

The reconstitutive method as applied to dreams, requiring as it does the tracing of waves of nervous excitation from their experiential source, has compelled the recognition on our part of the presence of the stimulus-idea, in a vast number of cases, under the form of a pre-existing reality to which the conscious recognition comes as a supplementary event after perceptual trials. We call these *ad-perceptual* reactions, signifying they are sequential to percepts. These perceptions have forced us to fall back on the assumption of Aristotle that an "idea" may exist in the back of the mind before it is recognized. This is demonstrated a hundred times over in the course of more than twice as many dreams.[9]

[9] Lest this result of our investigation should appear to be a gratuitous assumption, we refer the reader to the statement of James touching upon the nature of the automatic self and its capacity for carrying on perception and reaction. "It is a familiar fact that certain subjects when told during a trance to perform an act or to experience a hallucination after waking, will when the time comes obey the command. How is the command registered? How is its performance so accurately timed? These problems were long a mystery, for the primary personality remembers nothing of the trance or the suggestion, and will often trump up an improvised pretext for yielding to the unaccountable impulse which possesses the man so suddenly and which he cannot resist. Edmund Gurney was first to discover by means of automatic writing that the secondary self is awake, keeping its attention constantly fixed on the command and watching for the signal of its execution." James Psychology, Vol. I, page 208. Henry Holt, N. Y.

The term *stimulus-idea* thus constitutes an acknowledgment of the fact that a certain automatic marshalling of ideas takes place beyond awareness, in the ante-chamber of consciousness, before they are admitted to what Galton calls the presence-chamber of the mind. The reconstitution of a dream is the description of the events that have led to the subconscious arousal of percepts and the tracing of subsequent reactions which lead to a conscious ad-perception. The term stimulus idea refers to a fact of gross observation rather than to a detailed mechanism.

This takes us to the "resolution of the unadjusted." A stimulus idea may be fully formed at the subconscious level of nervous excitation and persist as such in the ante-chamber of consciousness. At the time of going to sleep the general level of excitation may be lowered and what was in the ante-chamber may reveal itself in the presence-chamber. That is, the full mobilization of the stimulus-idea, namely to the point of not being merely an automatic percept but becoming a conscious ad-perception will take place in sleep as a result of a shift in neururgic levels, permitting the subconscious percept to emerge into consciousness.

Nerve channels for a given stimulus exist by reason of the previous formation of automatic percepts. Therefore the excitation from most stimuli passes on to a definite pattern (neurogram) already formed by the experience of the subject. In some cases, however, there would be no existing equivalent for the stimulus and no formation of an automatic percept, which would embarrass further the lagging process of recognition. This constitutes a slight exception to what we have said about ready-made percepts in the ante-chamber of consciousness.

READY-MADE FEATURES OF PERCEPTION

Qualifications concerning the process of the "resolution of the unadjusted" cannot be given here in full, owing to the absence of specific examples. But the Scratch Reflex dream illustrates the resolution of an unadjusted stimulus idea (scratch sensation), which no doubt was correctly formed in the ante-chamber of the dream consciousness, although only tentatively recognized in the development of the dream. There is great danger in attempting to theorize about resolution in the absence of specific cases. Suffice it to say here that the results of the reconstitutive method justify us in stating that *most dreams, if not all, represent a trial and error method of working out a*

reconciliation among more or less fully predetermined mental tendencies. It is as if the stimulus ideas fully or partly formed in the ante-chamber of consciousness were presented as a problem for solution by consciousness. The "resolution of the unadjusted" seems to require an operation of the nervous system similar to that of an accountant's calculating machine, in which the various stimuli set a mass of rods and tumblers in specific positions so that the final or closing act (of operating crank of the machine) completes the calculus and imprints the total, quotient, or product, as the case may be, upon the paper roll. There is a great similarity between these operations and those which we find in reconstituting dreams, and the time relations are analogous. Conscious recognition or correct ad-perception is thus only a terminal stage.

It takes time to raise into consciousness the image most closely related to the stimulus; this being no doubt due to the passive inertia in the neurograms corresponding to the stimulus-idea. Meantime, during the apperceptive delay, the energy spills over into less appropriate neurograms, albeit they are more quickly mobilized, with the result of evoking bizarre imagery — what we call trial apperceptions.

NEGATIVE RESOLUTIONS

In the case of a stimulus such as a bladder sensation, or a brief sound in the sleeping room, or some perseverating thought, it is quite obvious that positive resolutions are not always necessary and do not, as a matter of fact, show themselves in the majority of cases. That is, the resolution of the stimulus idea does not result in a positive recognition of the nature of the stimulus, as it did in the case of the Scratch Reflex Dream. On this point I said in the paper on Scientific Methods in Dream Interpretation, "the resolution of the unadjusted is complete so soon as the stimulus is drained off, redistributed and automatically absorbed as in the case of mechanical 'lost motion.' A useful and intelligent solution is by no means requisite; mere rambling often suffices."

DEFLECTION OF STIMULUS

The reconstitutive method brings into light our theory that every apperceptive error or trial apperception involves a definite and distinguishable diversion of the stimulus from the normal straight path of recognition. For instance, the recognition of the scratching sensa-

tion on a dreamer's ear is definitely deflected into other channels than the right one by reason of there being open canalizations of memory (or ad-perceptual mass) which attract the impulse to themselves in preference to the normal course of association. In hundreds of cases we have found that the so-called "symbols" of dreams can be explained experientially by reference to known stimuli and *facilitations*, and that these can be given definite expression in diagrammatic form, thus removing the question of "symbolism" from the realm of mystical faculties and transcendental memories.

It is as unnecessary to postulate a special symbolising faculty in the dreamer's mind as it would be to suppose that rays of light have a will of their own to be deflected when passing through a lens of a given shape. We have found in practice that a definite trajectory can be plotted for the rays of association and that the process of dynamic conveyance of excitation from one set of nerve canalizations to another can be brought out by diagrams in relation to the various stages or zones of neurographic operations.[10] What is more, the cerebration in these zones can, in favorable cases, be observed and mapped out so as to lay bare the whole process of dreaming.

AD-PERCEPTUAL MASS

We will use the term ad-perceptual mass to represent the canalizations which come into play before the percept reaches consciousness. This replaces the term apperception which throws us back on older formulations. Our concept is not radically different from the older apperception, but it refers more particularly to those systems of canalizations in the nerve mass which deflect the stimulus from its normal course after the percept has been aroused in the perceptual centers. Anatomically, it suggests the nerve patterns connecting two well-known centers such as the visual area in the occipital lobe and the so-called visuo-psychic area with other more ramifying nerve tracts which pass to various centers of the brain. Experientially, the reconstitutive method brings to light delimitable and definitely assignable ad-perceptual masses so that the course of the stimulus from an inferred percept or experience can be diagrammed with surprising accuracy. *We can localize experiential regions.*

In view of the experience which we have had of this fact, year after year since 1909, it appeared reasonable to publish a hint of this

[10] To wit: the stigmatic zone between the sense organs and the perceptual center. The perceptual zone where the percept is elaborated by formation of nervous patterns. The adperceptual zone where psychic elements of a conscious type are brought into play.

fact in 1916, in contradistinction to the notion that Professor Bergson had expressed (from a different point of view) to the effect that an act of recollection involves the whole memory. On the contrary, we found in dreams as well as in waking life that the ranging of the mind is not unlimited and that while the dream does ramble "about Robin Hood's barn," nevertheless it does tend to narrow to a real point of relevancy. Our experience led us to regard Professor Bergson's whole view of "mental effort" in association as a conception allowable only on the ground that it was a useful *façon de parler*. Although his essay was not written from the standpoint of experimental psychology, he nevertheless included in it some features which fit perfectly with our own thesis, that is, he recognized the principle of what Lewis Carroll called the *portmanteau word*, which is "two ideas in one word." For he cites experiments of Goldscheider and Mueller, and Munsterberg which foreshadow strongly the mechanisms which we have repeatedly found in actual dreams. Also Bergson develops a physiological notion of *facilitation*, speaking of the more or less tension and readiness of ideas in the brain to react. But, curiously enough, he is not one of those who have realized that *facilitation* also implies a disturbance in the *time-relations* of mental phenomena. And he has made nothing of the phenomenon of apparent *time-inversion* which stands out as a challenge to any thorough-going theory of dreams.

TIME RELATIONS

As early as 1910 we had occasion to remark in the seminar of Professor Cattell at Columbia University, that it was sometimes easier to tell a dream upside-down than to relate it from its natural beginning; and further, that this reversal seemed to cause no confusion in reaching an interpretation.

It was some years before the cause of this paradox dawned upon us. It would seem that the course of the average dream (say 75% of dreams, excluding hypnagogic hallucinations) represent a *rise* of tension in brain patterns which is progressive and is apt to be a sharp stepping up of the neururgic levels. Sometimes indeed the stepping up is very easily observed from internal evidence of the dream, which becomes divided into *acts* separated, as it were, by a drop of the curtain — meaning simply a moment of blankness. In such cases it is found that there is a progressive increase of relevancy to the underlying "determining tendencies" (Titchener) or stimulus-ideas. Examples of three-act dreams with two "breaks in the dream" (scene

shifting phenomena) cannot be given here, because such dreams are necessarily long, either in the narrative or in explanation thereof. But we can allude to our experience with such cases, making much more pointed than otherwise the statement that *one can definitely explain the gradual increase of relevancy*, almost as if a charade were being acted in the different sections of the dream. At first the answer is vaguely sketched, then more definitely so, and finally, (as if in despair of the audience's intelligence), the stage manager of the dream presents additional clues. Sometimes the last scene would stand on its own feet without assistance derived from first and second, but when one takes all three, the co-relations are extraordinarily suggestive. They are so suggestive as to amount almost to Euclidean demonstrations of the meaning-values underlying the dream.

Seeing the definiteness with which the succeeding sections of a dream may build up a meaning, we took advantage of this sort of Euclidean proposition for simplifying our dealings with dreamers, in cases where their modesty, or sense of delicacy, might be offended with too raw discussion of moot points, especially when we were not sure of being on the right track. To explain: the definiteness of the dream interrelations permitted us to draw corollaries from the main proposition and choose the topic of that corollary. For instance, take a typical Freudian dream, that of a Viennese Jew; there was a mass of ill-related images which indicated a sexual stimulus idea, mixed up in a comparison between the dreamer and his brother-in-law. There was a final scene of the brother-in-law pushing one of those tube-set chandeliers to the ceiling. We inferred an anxiety regarding birth control, so we simply said, "Your brother-in-law can afford to have children!" We secured an immediate hit, which then justified us in disclosing the main proposition from which we had inferred the economic prosperity and sexual freedom of the brother-in-law. It was found then that the dreamer's symptoms were all related to interruptions in the marital relations due to economic reasons. He could not go as far as his brother-in-law.

Numerous successes of this sort led us to attach importance to the signs of *progressive relevancy* in dreams and to study more sharply the principle of approximation. This is how we came upon the mechanism of time inversion.

MECHANISM OF TIME INVERSION

The internal evidence of dreams frequently shows that, at the

beginning, the dreamer's range of thought is excursive and that later it settles down to a more definite line, as indeed is the case in the Scratch Reflex Dream. The reason for this lies in the fact that the stimulus, whatever it may be, is attracted to the already facilitated portions of the nervous network. Thus the facilitated portions of the nerve web tend to be discharged first, although in the meantime the stimulus may have aroused the proper perceptual center.

We have to conceive of two types of sequence; the travel of the wave of excitation from point to point, from one island of memory to another, as it were, and, secondly, the excitement or mobilization of the inhabitants of those islands. To vary the metaphor, we could conceive of the matter in terms of Paul Revere's ride as he dashes from the Old North Church and rouses the people. Their excitation depends to be sure on his shouting the news but before they get under way to mobilize themselves Paul Revere has ridden on. Now in his course to Lexington and Concord he may encounter a group of citizens already prepared in a military sense, in other words *mobilized*. They will thus reach the field of action much more rapidly than the citizens who are taken unawares. This is essentially the basis of time inversion. The facilitated portions of the brain react first although they may be stimulated last. To cut a long story short, the fact that a dream represents a wave of brain change traveling from point to point and exciting particular patterns in the nerve web entails inevitably a paradoxical disturbance in the time relations, as regards the sequence in consciousness. That is, unless optimum adjustment of mental tension is maintained — which is not usually the case in sleep.

In analyzing a dream we can forget the question of spatial brain localization because it does not thrust itself into our view; but no careful student of the dream can pass by the evidence of shifts in *time relations*. And the more carefully we look at the dream the more fully will the phenomenon of apperceptive lag impress itself upon our judgment as perhaps the leading element in creating absurdities and seeming irrelevancy of the dream.

Now the principle in question is fully set forth in a somewhat condensed paper entitled "The Apparent Inversion of Time in Dreams." [11] To attempt any further elaboration of the topic here would make this discourse unduly fatiguing. As it is, we need a few illustrations to come to our rescue. Let me take one from the psychology of linotype operation.

[11] Journal of Abnormal Psychology, April-May, 1916.

FREAKISH ASPECT OF ERRORS

While engaged in writing this paper I read on the editorial page of the *New York Times*, July 12, 1921, the following: "I, William Howard Taft, do solemnly swear that I will . . . faithfully and impartially discharge and perform all the duties incumbent upon me as Chief Justice of the United States . . . and that I will well and faithfully discharge the duties of the office on which I am about to *tener*." (Italics mine.)

The intent of the word *tener* would seem to be plain. The average person would think he could guess the word that the linotyper should have managed to register. The victim of the psychologizing habit, however, is obliged to take a second thought. Is not *tener* an old-fashioned word suited to the formulas of ancient legal rites? Shall we go into philology and folk lore? Let us at least give the psychoanalytic type of thought the benefit of the doubt as long as possible. *Tener* according to Murray's Oxford English Dictionary is an obsolete form of the word *tenure*. Certainly this is a very apt word, considering that Mr. Taft is entering upon a new tenure of office. Shall we say that this lapse, or error, is an adumbration of the ancient meaning projected through the ages upon the mind of this linotype operator, whose remote ancestors in the British law courts may be thrilling with satisfaction over the tenure of the chief justiceship by William Howard Taft? Perhaps they are! One might like to so regard it, reminiscing along in the spirit of Rudyard Kipling's story of "Wireless" where the Apothecary is placed in touch with personages of the remote past. "Psychanalysis" is entirely reconciled to this sort of reminiscing. The archaic symbolisms of Freud, the archetypes of Jung, and various other sacred "arcs" or shifting conceptions which cannot occupy us here, all have something of this flavor of mysticism. It means dispensing with accurate analysis from the standpoint of the present day world.

But it is time to stop hitting the psychoanalysts. Let us rather illustrate the opposite of their distinctive methods. We turn to the mechanistic layout of the linotyper's operation. We note that he operates a keyboard with an arrangement of letters somewhat like that of the standard typewriter. In explaining the word *tener* we have only four keys to consider, the three consonants *T*, *N* and *R*, and the vowel *E*, which appears twice. Now we notice that the consonant *N* occupies a solitary position in the bottom row of keys.

E, *R*, and *T* are side by side in the order named in the left top row. A mix-up is very likely to occur under these circumstances since the reaction is not "spaced out" by need of deliberation in shifting the position of hand and fingers. Further we find internal evidence indicating that the finger operating the letter *T* has been facilitated by recent movements, whereas the right hand has been more or less resting. Therefore, when it comes to the word *enter* which is the stimulus idea, *T* gets ahead of the game. *N* slips in after the first *E* as it should, having formed a union at the start of the reaction. In the same way, we may regard the reaction as an inversion between syllable *EN* (represented by *E* alone in left hand) and *T*. Their positions are interverted by reason of the inertia of the letters *N* and *E* and owing to marked facilitation of the letter *T*. Thus the problem of time inversion is very well illustrated.

Examples without end of this sort of interverted reactions can be found in the newspaper, in the lapses of everyday speech, as well as in dreams.

TIME-SEQUENCES IN THE DREAM PROCESS

The value of recognizing the element of time inversion lies in the fact that it leads us to carve up a dream into *constituent reactions*.

We can realize that each constituent of the dream (like letters in the linotype slugs) is operated in sequence from some definite source of excitation or stimulus. The dream is thus a sort of shifting mosaic of elements combining and recombining in a manner suggesting an analogy to a kaleidoscope. But it is not sufficient to look upon such kaleidoscopic shiftings as peculiar to the dream. We ought to learn something from them as to the mechanism of thought.

We should be prepared by the consideration of such illustrations to recognize the influence of mere time relations in creating disturbances of thought. Such examples should warn us by their similarity to other examples in daily life, that it is very easy to imagine a transcendental reason for certain vagaries in a dream even when a simple mechanistic view would set us on the practical track. It is well to bear in mind that the parallel to the inversion of time in dreams is found in daily life under the name of Spoonerism, owing to the amusing interversions of words and syllables for which Dean Spooner of Oxford is famous.

Other mechanisms observable in dreams (but so far not described with anything like scientific definiteness) can fortunately also be allied with the productions of two well-known persons. We refer to Lewis Carroll, the whimsical inventor of portmanteau words, and to

another less literary mathematician, Pierre Vernier, who gave us the instrument known as the vernier scale. We shall invoke the names of Carrollism and Vernierism to indicate some of the effects of *coincidence in time* of two more or less irrelevant stimuli; for coincidence between irrelevant perceptions as well as lack of coincidence between relevant ideas produces equally an effect of irrelevancy and absurdity. Let us note at the start, however, that the special forms, like Spoonerisms, Carrollisms and Vernierisms often produce effects of the greatest degree of seeming aptness, thus masking to some extent the mechanism whereby distortion or shift from true relevancy is produced. For example, there is a well-known Spoonerism: "Excuse me, Sir, I think you are occupewing my pie. If you will come with me I will sew you to a sheet." Again there is the famous portmanteau word of "*frumious*" meaning *furious* and *fuming*. Lastly, for Vernierism we find it a little less easy to obtain illustrations. This is partly due to the fact that the principle of the vernier as a combination of two scales, is but little understood outside of engineering offices. The point is that each of the scales is graduated differently, one will have ten divisions to the inch, and the other will have nine. The result is that there will be *want of coincidence* within each space of one inch, nine divisions of one corresponding to ten divisions of the other. Suppose any two gradations placed opposite each other, then on one scale the ninth division beyond will coincide with the tenth division beyond on the other scale. This implies that the two scales which appear at first to show complete disparity and to be without common denominator, prove on closer analysis to be in coincidence at remote intervals in spite of lacking coincidence, proximately. Now this formula applies exactly to the mechanism of dreams which we call Oniric Vernierism.

ADVENTITIOUS CONCORDANCE AMONG STIMULI

It is found in dreams that when two stimuli are set for simultaneous action, as in the case of (a) hunger, and (b) a screeching sound, there will be a sort of mutual interplay even if the first stage of the resulting dream appears out of all relation to the stimuli.[12]

[12] In the so-called Pantry Cupboard Dream there was this apparent lack of correspondence between stimuli and reaction, and neither sound nor hunger were properly represented in the dream. But on careful study of the dream it turns out the initial irrelevancy of dream is mitigated and remedied in further course showing finally that the two stimuli in question have searched out remote points of connection and that the precursory images of the dream lead up to the mental evocation of images that have definite relevancy to both hunger and sound. What is more, the very first image proves to have had a peculiar relevancy to the appropriate stimulus-ideas. (JOURNAL OF ABNORMAL PSYCHOLOGY, "Irrelevancy of Dreams," August-September, 1916.)

One cannot explain the evident searching out of common points for a *rendezvous* of excitation from the two sources, unless one supposes the nervous system to be provided with a system of graduations in the neurone patterns that permit the finding of a common point, as exactly as in the Vernier. This observation is, in fact, the groundwork for what we shall call the doctrine of unit-concordance; meaning to say that the nervous system tends to take account of units of the stimuli, *not wholes*. To paraphrase an idea of Wundt, association is not between ideas as a whole but between their parts. This is a special doctrine coming within the purview of the doctrine of Relativity as Wundt and Ladd have explained it.

THE TWO UNIFYING DOCTRINES

In order to explain Spoonerisms, Carrollisms and Vernierisms, we have fixed upon two mechanistic formulations. I have personally had to take the responsibility of giving a name to the general results of our investigation of dreams and to connect somehow with theoretical psychology the observations upon dreams which we have so often verified. For on the one hand my associates are not all graduates of psychology but mostly intelligent subjects whom I have led (on various occasions) to observe in dreams what was plain to be seen, if only one approached the matter with plenty of time and gave it plenty of thought. On the other hand, a trained psychologist wants some classificatory guide rope before taking the submarine dive to the bed rock of dream psychology.

To connect up with the dry land of orthodox psychology of association, I called the doctrine that unifies the trial-and-error theory of dreams by the name of Co-relativity. This harks back not only to Wundt and Ladd, but to the general proposition of Herbert Spencer that "we think in relations." It may be summarized in the phrase that *the meaning of a dream image is its relation to other co-ordinated systems of memory and is not absolute in itself, but gauged by the concurrent operations of neurograms at the moment of dreaming.* This will help us to understand the idiosyncrasies of dreams and dreamers quite apart from that elaboration of the principle of the "personal equation," produced by Dr. Einstein under the name of "Relativity."

Further, lest the word relativity should augur an Einstein-like

complexity, I have put in the prefix *co* to indicate the compounding of associations that is revealed by our dream analysis.

CO-RELATIVITY — THE CONCORDANCE OF THOUGHTS WITH EXPERIENCE

In dreams there are countless illusions or hallucinations which can be understood in last analysis only by the doctrine that our perceptions and ad-perceptions are not absolute nor determined by a mystic bond between some vague Past and our present reaction, but are relative to definite elements of memory whose exact co-ordination is the one condition on which the correct and proper response in consciousness will be evoked. Every relevant response has its recipe or formula.

The nature of irrelevancy, therefore, can be explained in terms of Co-relativity by supposing a slight shifting in time relations whereby the co-operation of the component elements of the stimulus is abrogated. Thus we can see that immense departures from relevancy in dreams (although reaching the point of absurdity and nonsense) can be reduced by the principle of co-relativity to a slight shift in the points of coincidence or *rendezvous* in the nervous system. In sleep, this is determined by a *departure from formal arrangements* for (waking) attention to definite stimuli. This in turn we take into our theory in terms of *facilitations* and *apperceptual delay*, which are converse to each other. The principle of Co-relativity bears also upon the bizarre results of stimuli, that normally do not co-operate in a common sphere of influence.

To give examples in full would be to repeat what we have already written with considerable care in a paper on "Irrelevancy in Dreams."[13] The ordinary doctrines of psychological relativity go no farther than to point out the philosophic importance and real presence in the nervous system of the delicate relationships of simultaneity and of succession that underlie a patent mental state. It is these relationships which we have been able to analyze in their most intimate co-operative or conjunctive aspects and have unified as a doctrine of co-relativity, which comprises a full explanation of the dream mechanisms that we call Time Inversion (Spoonerisms), Oniric Carollisms, and Oniric Vernierisms.

[13] JOURNAL OF ABNORMAL PSYCHOLOGY, August-September, 1916. This shows how a sound simultaneously with a feeling of hunger will produce a surprising fancy in the sleeper, of a little boy standing on a chair in front of a pantry cupboard, a situation which at the start seems quite irrelevant to either stimulus but proves to be adjusted with vernier-like accuracy to the demands which these coinciding stimuli make upon the nervous system.

Wundt furnishes an excellent general formula by which one may bridge any gap that there may still be between orthodox teaching about psychological relativity and our general doctrine of co-relativity in dreams. (Outlines of Psychology, pp. 232.)

In parentheses we insert references to our own views.

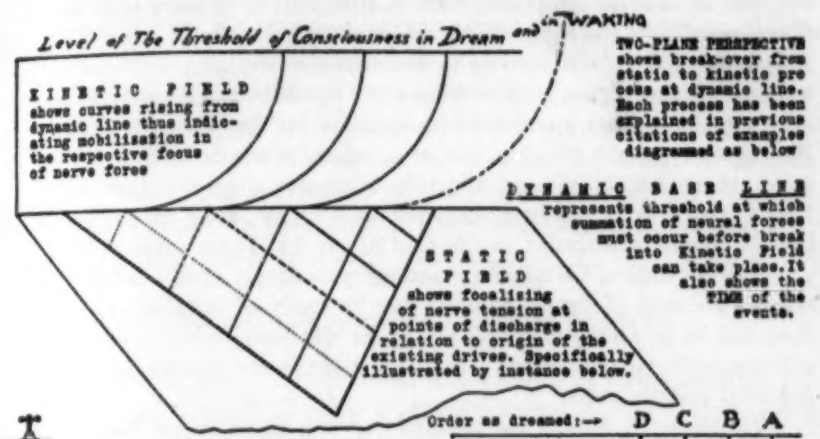
"*The interconnection of psychic processes, which constitutes what we understand under the concept consciousness, is in part a simultaneous interconnection, in part a successive interconnection. The sum of all the processes at a given moment is always a unitary whole the parts of which are more or less closely united. This is what constitutes the* simultaneous *interconnection* (Carollisms or portmanteau-words and Vernierisms or remote reconciliations of two stimuli touch this aspect). *On the other hand, a present state is derived directly from that which immediately preceded it, in one of two ways. Either certain processes disappear and others change their course and still others arise,* (as in the fading of images in a dream to give place literally to other figures) *or else a state of unconsciousness intervenes and the new processes are brought into relation with those which were present before.* (This fits the "break in the dream" and also a peculiar patching and filling which is clearly shown in dreams as a sequel of the irruption of irrelevant imagery into the dream consciousness; the latter function being a variety — hitherto not described — of disturbed time relations midway between Spoonerism and Vernierism.) *These are what constitute* successive *interconnections. In all these cases the scope of the single combinations between preceding and following processes determines the state of consciousness.*"

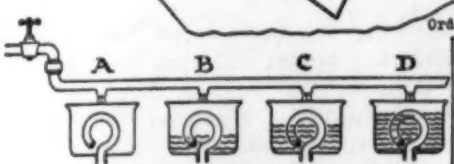
VALUE OF CO-RELATIVITY AS A DOCTRINE

I quote these words only to show that orthodox psychology possesses formulas of relativity that are capable of helping to bring the doctrine of co-relativity, with its specific principles and mechanisms into the common ground of psychology. However, co-relativity concepts are founded, not on such all-too-general formulas as the above, but on highly specific experiences, through dream analysis, of the co-relation of specific points in given dream phantasies with definitely established frames of reference furnished by the life history of the individual dreamer, and a verification of his immediate mental and physical situation.

Thus, the Doctrine of Co-relativity is adequate to clothe with highly specific meanings at least two out of the three principles that Wundt characterizes as "fundamental and general principles of psychic phenomena. These are the principles of *psychical resultants*, of *psychical relations*, and of psychical contrasts."

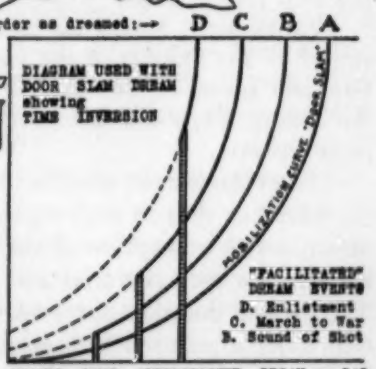
The principle of *psychical resultants* fits well into our scheme of co-relativity, destined to explain the resolution of physiological forces underlying "approximations" and such mechanisms as the blended response to


Level of The Threshold of Consciousness in Dream and WAKING
KINETIC FIELD shows curves rising from dynamic line thus indicating mobilization in the respective focus of nerve force
TWO-PLANE PERSPECTIVE shows break-over from static to kinetic process at dynamic line. Each process has been explained in previous citations of examples diagrammed as below
DYNAMIC BASE LINE represents threshold at which summation of neural forces must occur before break into Kinetic Field can take place. It also shows the TIME of the events.
STATIC FIELD shows focalizing of nerve tension at points of discharge in relation to origin of the existing drives. Specifically illustrated by instance below.

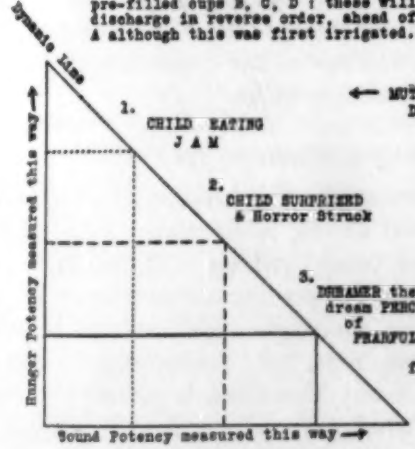


SIMPLE TAP AND RESERVOIR DIAGRAM FOR VISUALIZING TIME-INVERSION

Each unit A, B, C, D, is a so-called Tantalus Cup, which has the property of emptying suddenly when it is near the filling point. This is due to a siphon action of the Q-tube which is set off when liquid rises to its top Pre-filling cup makes its siphon set the sooner. Now suppose flow from a tap T irrigates A first and then the pre-filled cups B, C, D ; these will discharge in reverse order, ahead of A although this was first irrigated.


Order as dreamed:→ D C B A
DIAGRAM USED WITH DOOR SLAM DREAM showing TIME INVERSION
MOBILIZATION CURVE "Door Slam"
"FACILITATED" DREAM EVENTS
D. Enlistment
C. March to War
B. Sound of Shot

CURVES SHOW APPERCEPTIVE DELAY or LAG affecting each perceptual center in due proportion to its previous facilitation


Dynamic Line
Hunger Potency measured this way
1. CHILD EATING JAM
2. CHILD SURPRISED & Horror Struck
3. DREAMER then has dream PERCEPTION of FEARFUL SCREECH
followed by
4. WAKING RECOGNITION of Sound Stimulus
Sound Potency measured this way →

← MUTUAL REINFORCEMENT OF STIMULI AT DYNAMIC LINE Diagram shows shifting ratio of two conjoined sensory drives confluescing at three stages in Pantry Cupboard Dream shown by dotted, broken and full lines It would seem that at start of dream odds were set 8 to 1 in favor of a HUNGER response; but as hunger is relatively less potent odds become even and imagery obeys both cues. Then odds turn one to three so favoring the response consonant with fear-quality of sound, ending with alarm and waking RECOGNITION

Facilitation is supposed absent in this particular case and the mobilization curves are assumed to rise from dynamic base line.

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two cues in obvious compound form (Carrollism) or in more recondite shape (Vernierism). Wundt's principle of psychic relations is essentially what co-relativity, as a doctrine aims to state more specifically, with due reference to concepts that figure large in Wundtian formulations, namely *apperceptive analysis* and *relative quantitative comparison* in the sense of Weber's law. But beyond this, in his principle of *psychical contrasts*, and in his involvement, therewith, of the six affective dimensions, we feel that we cannot follow (except at a distance) because he is really losing his way, owing to lack of definite orientation in the field of psychical operations.

The doctrine of Co-relativity attempts to supply such a definite orientation in the field of dream analysis by the study of suitable examples that there can be no excuse for vagueness or for wandering afield toward doctrines of transcendental symbolism, archaic language forms or other pseudo anthropological mystifications.

For example, finding the co-relativity of a given dream item is demonstrated in the plotting of the psychical relations and their co-ordinates in time and space, as was done in a geometrical diagram that schematized the Pantry Cupboard Dream (Vernierism) and the Door Slam Dream (Spoonerism).

Something more specific than the general doctrine of Co-relativity (involved as it is in philosophy and general psychology) is needed to attain a full conception of the trial and error process that makes the dream. In fact the trial and error theory comprises two doctrines. The general doctrine of co-relativity which establishes the position of the theory in relation to physiology, psychology and philosophy on the one hand, and a special doctrine which narrows down the former to an original formulation based on the findings of our dream investigation. This is called the doctrine of Unit Concordance.

THE DOCTRINE OF UNIT CONCORDANCE

This teaches that specific elements in the situation of a dreamer, including his external and internal drives, is co-related in a highly detailed manner with the state of component units of the situation and the functioning of highly subdivided portions of memory. These are called unit constituents and are specified and referred to as unit constituent of "whiteness," of "hastiness," of "multiplicity" and by those other terms which will be found illustrated in orderly fashion either as class relationships or as rough synonyms in Roget's "Thesaurus."[14] The doctrine of unit concordance exhibits for the explanations of dreams a set of findings which makes the apparatus of memory

[14] Roget's Thesaurus. Edition of 1888; London, Longmans, Green & Co.

understandable in its working, even as we would understand the working of a mechanical concordance to the Bible or Shakespeare.[15]

Instead of our spending time in working out artificial concordances through arbitrarily selected unit-constituents, as formed by lexicographers, we have chosen to make intensive study of similar co-relations and concordances in actual dreams and we have become better acquainted with that indexing machine, which the memory is, through listening to narratives of dreamers.

WHY MENTAL CONCORDANCES CAN BE GRAPHED

We have certainly fortified our confidence in the assertion by R. W. Emerson that: "There is no book like the memory, none with such a good index, and that of every kind, alphabetic, systematic, arranged by names of persons, by colors, tastes, smells, shapes, likeness, unlikeness, by all sorts of mysterious hooks and eyes to catch and hold, and contrivances for giving a hint."[16]

But in spite of this complexity we have found that the concordances in the operation of unit-constituents — forming a dream — can still be brought within the purview of a definite scheme. We find in most cases that stimuli behave in a very controlled fashion and there is stimulus-control in the dreaming process very much as there is controlled motion when a moving mechanism (such as the Stephenson valve-links of locomotives) demonstrate flexibility of displacement even though under control of absolutely rigid rocker arms and levers. In other words, definiteness of connections does not preclude variability of adaptation, a fact which we have tried to embody in the diagrams showing graphic analysis of dreams. These indicate in what way three more or less rigid elements of a situation

[15] Similarly let Roget's "Thesaurus" stand for apparatus of memory and let us stimulate it with proper cues taken at random, say *desk* and *digging*. Leaving the index to guide us in further reactions, desk relates to *box* 191, *support* 215, *school* 542 and *pulpit* 1000. *Dig* is associated with *deepen* 208, *excavate* 252, *till* 371, etc. Page 191 takes me to *receptacle* as a black letter title and under it *shovel*, thus establishing instantly a connection with *dig*. *Shovel* is thus determined as a first reaction and constitutes my first definite mechanical concordance with *desk* and *dig* through unit constituent *receptacle*. So far, then, Roget's "Thesaurus" shows a given bond between *desk* as a *receptacle* and *shovel* as a special form of *receptacle* adapted to *digging*. This is Roget's "Thesaurus" adaptation rather than adaptation of my own memory which would have supplied more complex responses. For my mind is not able to react with such narrow selection of unit constituents, at least not when I am awake. Thus Roget's "Thesaurus" illustrates the simplicity of associative operations and thus literary work or the concordance to Shakespeare and the Bible could all be used to illustrate *ad infinitum* all the varieties of concordance of ideas through channels provided by particular unit constituents.

[16] Emerson, R. W., Works, Vol. XII, p. 66, "Memory" Houghton, Mifflin & Co.

may co-operate in a dream and produce highly varied reactions. We refer to those elements which constitute the "frame of reference" in each case of dream analysis by the name of *principal cue*, *accessory cue* and *facilitations*. So far, we have not attempted to plot diagrammatically the influence of more than two of those elements at a time, simply in order that we might depict the movement of events by means of a one-plane diagram.

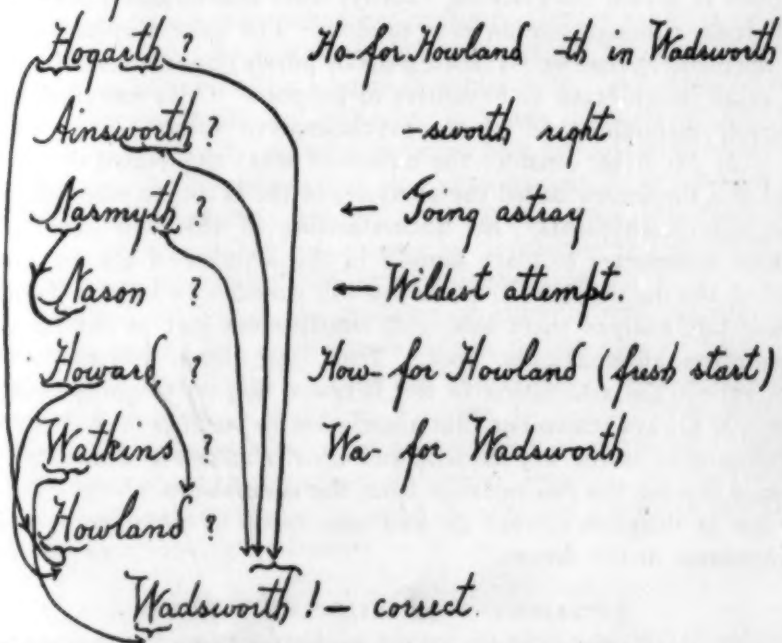
At the same time, a model could be very conveniently built which would represent the relations of all the elements in three planes. But far better than to elaborate on analogies of geometry would be to elaborate on actual dreams of actual subjects. For geometrical graphs cannot be anything but a convenient form of notation for recalling to mind interrelations of dream images and other inferred concomitants of the neural operations. We cannot expand the chapter of examples in this paper, but we can summarize the trial-and-error theory with its general doctrine of co-relativity and the special doctrine of unit-concordance by a rapid survey of one or two examples.

TRIAL AND ERROR IN RECOLLECTION

The first is of trial and error in recollection. The diagram speaks for itself. It was furnished to me by Dr. P. G. Stiles to whom I submitted my trial and error theory of dreams together with a large number of illustrations. We could match with examples from dreams each one of the reactions which he cites and which he has distinctly given by name. For instance Hogarth is a trial apperception of Wadsworth, in which the influence of a syncopated Howland is adumbrated. Thus at the beginning of the reaction Wadsworth-Howland is seen to be a determinate apperception mass, yet Howland does not appear until just before Wadsworth does. To match each trial percept in this diagram would require the relating of a long dream because reactions of this type usually extend through narratives of considerable length. Each dream narrative requires to be analyzed to bring out the true nature of the cues or of the unit constituents which determine the concordance, and then one has to lay out a scheme of co-relativity so that the trial and error process may be followed intelligently. To repeat, this Hogarth-Wadsworth series is a paradigm which embodies most of the essential interrelations of unit constituents of dreams. It shows the particulate character of reactions. It shows effects of similarity and contiguity associations. It shows sheer association by contiguity *in toto* as in Howland-Wadsworth, as well as the

Trial and Error in Recollection.

I wish to recall the name of a certain street along which I often pass. These names come into my mind:



Howland suggested Wadsworth because of the Wadsworth–Howland Company. Both names were foreshadowed in the series.

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particulate reactions to the *T H* in Wadsworth; as shown in the Hogarth-Ainsworth series where also the particulate influence of the stimulus-idea Howland, (which is subjacently contiguous to Wadsworth), is represented by *HO* in Hogarth. Thus any one who applies successfully the doctrine of Co-relativity and unit-concordance when tracing out the creative process in dreams must bear in mind all these multiple relationships and must have classified already three principal types of co-relation. (1) He must know the confusing by-effects of mere accident or adventitious circumstances. He must discern probabilities in dream associations, namely, what stimuli shall have certain affinities, although coming in at random. For there may be material in the memory that would create puns by purely opportunistic reactions of mind insignificant as to motive or purpose. (This sort of thing is entirely misunderstood by the psychoanalytic school.)

(2) He must consider the nature of what the School of Pavlov and von Bechterew called the *analysors* of the brain, on which depend the unit constituents. An understanding of this will permit the dream interpreter to place himself in the attitude of the automatic self of the dreamer, in so far as he will conceive of objects *not as a whole* but analyze them into unit constituents just as the memory apparatus automatically does. Thus the dream interpreter will not expect the association *in toto* between objects to govern dreams but will always remember that association *in partibus* (e. g. Hogarth-Wadsworth) is the key to trial and error processes in dreams. This means tracing the concordance from the components of the stimulus or cue or situation *through the unit constituents* to the response which eventuates in the dream.

ENTELECHY — THE INTERPLAY OF DRIVES

The interpreter must learn to formulate in his mind a working conception of *entelechy* in the sense in which we could apply the word to the organism's attempt to realize a definite aim already prepared in the subconscious depths, as it were. This notion is definitely imposed upon us by such an example as the *Wadsworth* recollection of Dr. Stiles. In an obscure sense, because I have not yet been able to fit an appropriate word to it, Dr. Stiles had formed a correct idea of the stimulus *Wadsworth*. It is as if a definitely circumscribed region of his nervous system was holding the excitation which was destined to eventuate in the recognition of the correct street name. This is a situation absolutely analogous with that created by the

working of an algebraic formula in a mechanical system, as for instance when a locomotive leaves the track at a curve and pitches over an embankment. It describes a ballistic curve known to engineers by the equation

$$y^2 = 2px$$

As a clever Frenchman has said, this formula of algebra contains within itself all the future developments of its curve and is the law that guides it. The entelechy of a dream, in this sense, is a reality and furnishes the refutation of the skepticism which denies existence to subconscious ideas. The implications of the "dream entelechy" in philosophy are tremendous and may lend themselves to extravagant interpretations. In our work, however, we do not assume the entelechy to be present as a basis of explanation. We simply observe it in operation while not including it in the premises on which our inferences are based; and our suggestion here, concerning the entelechy, is not intended to postulate it as a premise, but *prevent it from being excluded by hypothesis*. We would be just as much disturbed, on the other hand, to see any one assume, as psychoanalysts do, that there is always some definite wish guiding a phantasy.

In our studies of the working of external and internal drives we have found them truly comparable to the working of formulas of analytical geometry. That is, the compounding and combining of "drives" have been found to conform to definite laws possessing regularity and simplicity, and which are only in appearance abrogated by the complexity and variety of human memory. In the tracing of unit constituents we have found that order and not chaos reigns even in the most fanciful of dreams.

THE METHOD OF RETROSPECTIVE PROPHECY

The uncertainty that is alleged to surround interpretations of dreams comes only from the vast fields of combinations which memory affords. Yet in dream-study a survey of the unit-constituents that are open to detection soon shows that the play of memory is vastly reduced — as compared to waking operations. It is therefore possible to treat the dream as a "natural experiment" and to apply concrete experimental methods to strengthening or validating the conclusions drawn from it. The method that we have employed for testing the validity of our cases has been called the "Method of Zadig" by Thomas Huxley. This involves a simple use of "verified prediction." In the case of dreams, the predictions are necessarily

retroactive, and take the form of saying to the dreamer on investigation, "You will find that such and such events preceded this dream." Often the result is extremely startling to the dreamer and may even cause one to be mistaken for a mind reader.

Here is an example of this method: — "I dreamed that I was preparing some tobacco for my brother. I was stuffing it in a jar and mixing it up to send to him for his delectation. It was a light yellow tobacco and it occurred to me that I could improve it by adding something to it, so I put in some large raspberries just to make it taste good. Now why should I dream of that?" The retroactive prediction was made as follows without further questioning except to verify the fact that the dreamer was a non-smoker and his brother actually a smoker:

"I think that you had intestinal trouble last night. Did you have to get up after the dream to go to the closet in the night?" Answer "Yes." "Had you taken some raspberry shrub or something like that the night before?" Answer, "Well, not exactly, I had taken some acid phosphate and I sometimes mix it with loganberry juice because I like it better that way. I was sorry I didn't have any last night."

The dream stands interpreted as follows: The light yellow tobacco is an adumbration of stimuli from the bowels with possible influence from the bladder. The stuffing of the jar is hyperbolic magnification (auxesis) of sensations from the rectum and is a play upon the unit-constituent of *container* or *receptacle* (note coincidence with Roget's Thesaurus!) and with the idea of stuffing a pipe to keep the tobacco from spilling. The existence of these *rectal sensations* and the need of resolving the stimulus in obedience to the ideas of *spillability*, and of *continence of excreta*, required that a reconcilement of tendencies should be developed. What was the ulterior motive or accessory cue operative in the dreamer's mind? This ulterior motive was a desire for a flavor such as loganberry, which he had been unable to enjoy the night before in taking his acid phosphate. This drive, emanating from the thought of a berry, facilitated the reaction to certain other unit-constituents which were those that I based my first guess upon, namely likeness between a raspberry and the shape impressed upon the intestinal detritus by the impacts of intestinal walls. Thus, the unit-constituents of *yellow* and *raspberry contours* gave the clue, adumbrating the intestinal origin of the dream, and fixing the principal cue. Then the possible facilitations were worked out as due to

some experience involving fruit juice, as would be probable, and lastly the fact of the unsatisfied wish was brought out in consequence of the verification of the two other points in retroactive prediction. We could give hundreds of examples of this kind showing how two cues become involved, and how by inferring two elements in an experiential frame of reference, we can work back with great accuracy to elements that are unaccounted for.

THE INTERPRETER'S TRIALS AND SUCCESSES

We do not doubt that similar things are done constantly in psychoanalysis. As Aristotle says, "A plain dream can be interpreted by any one," and there are all degrees of plainness. But a danger of trying to work at dream analysis on the basis of unscientific theories, is that we fall into peculiar errors which Bacon alludes to when he says that "men count the hits but not the misses." For more than ten years, examining thousands of dreams and hundreds of life histories in detail, we have made it a business to be as much interested in the failures of our interpretations as in the successes. We have, in other words, applied the groping process of trial and error to our own investigation, and think we have finally worked out a technique which minimizes errors and leads more rapidly to "trial and success."

This summary would need to be supported by numerous examples of dreams. These, as stated, we could supply in a manner that would match each and every aspect of Dr. Stiles' excellent diagram; but there is no space in an article of this length. Such a selection of examples should be embodied in a book, where cross references are possible and repeated references to the same example can be carried through chapter after chapter.

SUMMARY AND CONCLUSION

In the meantime, pending the appearance of such a work we can only point out that the trial and error theory has been formulated here in general terms and supported by hints of its practical results. It has validity, in so far as it concords perfectly with accepted formulas of psychology, which we have embodied in our general theory of Correlativity. And it is vindicated in actual practice by the method of retroactive predictions. This shows that the best way to reach sensible interpretations of dreams is to observe mechanistic rules that open one's eyes to the unit constituents. These operate in dreams to form concordances, through every sort of permutation and com-

bination, giving a vivid demonstration of the adaptability of the human mind, while still not throwing mechanistic analysis off the scent.

These doctrines (far from imposing the straitjacket of mechanical concepts on the human soul) reveal infinitely more resourcefulness and purposiveness in the structure of the human mind than has ever been successfully explained by the extravagant anthropology and philology of Freud and Jung. The doctrine of Co-relativity and of Unit-Concordance will serve especially to clarify those issues which have been unduly complicated by dogmas of symbolism and of censorship. The future of Psycho-neurology lies in recognizing the full power of these doctrines where certain explanations are still wanting in the psychoses and psychoneuroses. But the main contribution should be in giving a so far undreamt-of degree of precision to our knowledge of the mechanism of thought. Onirology shall yet furnish a proper doctrine of association and of human motive grounded in exact knowledge of *stimulus and response* in dreams.

ACKNOWLEDGMENTS. In order to formulate the doctrines of Experiential Co-relativity and of Unit Concordance, it was necessary to obtain considerable collaboration. The *extensive* investigations of dreamers' life-histories was made possible at the Boston Psychopathic Hospital with the kind concurrence of the late Dr. E. E. Southard, and President Henry Lefavour, of the Board of Trustees. Special assistance from the Massachusetts State Board of Insanity provided clerical help for the work at this time (1912–1914). Especially good subjects from the Hospital were studied during the period of After-Care, and for a number of years, with the co-operation of the Emmanuel Church Social Service. The dreams of normal subjects were furnished mainly by friends associated with the Cartesian Research Society of Philadelphia; whereby it was possible to follow the course of dream-processes over long periods of years, and to study intencively the parallel between dream-fancies and real life.

SLEEP AND DREAMS

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A SURVEY of the numerous physiological theories of sleep cannot fail to create the impression that so far as its ultimate causes are concerned, sleep is still a great mystery. Fortunately for empirical psychology, we may arrive at a considerable knowledge of the actual conditions of sleep without concerning ourselves with ultimate causes. An interesting and important body of empirical physiological facts have been obtained, aside from those observations whose results are questionable; and much psychological information is available.[1] It is possible to organize these bits of information into a significant general conception, using as a "physiological theory" only a general schematic formulation which represents the facts in a systematic way, and which need be adhered to only as a scheme, or diagram, of the psychological facts, like any other theory of "brain physiology" applied to mental phenomena.

The most general fact of the physiology of sleep is *lessened reactivity*. There is relaxation of muscular tonus; large decrease in activity of the striped muscles; similar, if not so great, decrease in activity of smooth and cardiac muscles; lessened glandular secretion; and (by inference, rather than demonstration), lessened activity of the neurons as a rule. With this lessened function may perhaps go increased chemical activity of certain sorts, during a part of sleep: specifically, increased anabolic activity: but this is conjectural.

Specific effects of lessened activity are found in reduced blood pressure, arterial and venous; slowed heart rate; slowed respiration; and changes in the form of the curves of respiration, heart beat, and probably of intestinal peristalsis. The relaxation of the muscles of the blood vessels is productive of change in distribution of the blood: the peripheral blood vessels are relaxed, and the quantity of blood in peripheral tissue increased, during the early part of normal sleep at least.

The *pressure* of blood in the cerebrum decreases, as elsewhere, as has been demonstrated in human subjects from whose skulls areas

[1] Detailed reference to the extensive literature on sleep cannot be introduced here. For admirable summaries see Howell's *Text Book of Physiology*, and Piéron's *Le probleme physiologique du sommeil.*

of bone have been removed: whether this is accompanied by an increase or decrease, relative to the body, in blood *supply*, *i. e.*: a decrease in quantity of blood passing through the brain-tissue in a given period of time, does not seem to be made out. In general, all these changes are most profound in the early hours of normal nocturnal sleep, and conditions tend towards the waking type during the latter two thirds of the night.

Relaxation of striped muscles produces the closing of the eyelids, divergence and rolling upward of the eyes, heaviness of the limbs, snoring, and other familiar symptoms of drowsiness or slumber.

The existence of toxic substances of some sort, produced during waking hours and conducing to the evocation of the various sleep symptoms, has been demonstrated; although the primacy of these toxins as causes of sleep is not undisputed.

While body activities are in general lessened, there may be heightened functioning of certain organs during certain moments of profound sleep. The most conspicuous example is turgescence of the sex organs, frequently eventuating in the complete orgasm, in some cases disturbing the sleep, or even causing the awakening, but in other cases apparently not disturbing the general slumber. Although this sex activity during deep sleep is more common in the male, it occurs also in the female. It is conjectured that other organic activities — such as digestion — may also at times proceed during deep sleep as actively as in waking states; but the evidence on this point is less clear.

On the psychological side, the phenomena are abundant. In the period just preceding sleep, fatigue of specific muscle groups, especially of the eye mechanism and the voice mechanism, are characteristic, even when there is no general fatigue. On the other hand, there may be general fatigue of moderate or extreme degree, with no tendency to sleep. The "heaviness" of the limbs is usually perceptible in drowsiness; and in general, the "sleepy" feeling is more characteristically a feeling of relaxation than of fatigue.

The absence, or lessening of response to sensory stimuli during sleep is well known; and it has been proposed to measure the "depth" of sleep by the intensity of stimulus required to awaken a sleeper. Measurements of this kind have been carried out, principally with auditory and electrical stimuli; with results which are in agreement on the general fact that normal nocturnal sleep deepens more rapidly at first, reaching a maximum during the first or second hour, and then

decreasing very rapidly during the second and third hours, and slowly thereafter. Further than this, the results are not in complete agreement, and have only suggestive value. The difficulties in the way of adequate experimental determination are great, since, of course, each sleeper can be awakened but once in a single night, and hence the determination of the sleep curve for a single person with a single sort of stimulus must extend over fifteen or twenty nights, with consequent difficulty in obtaining constant conditions. Since the "depth" of sleep to one stimulus (such as sound) does not necessarily correspond to the "depth" for another sort of stimulus (such as touch, or electric shock), a complete experiment on one person is something which has not yet been attempted.

The most characteristic symptom of the disposition towards normal sleep is the *lowering of attention*, which exhibits here its two characteristic forms, one of which is lessened ability to sustain the attention to any given object or unified topic. This manifests itself in an increase in the height of the "peaks" of attention, relative to the dales or "slumps," which become more profound; and also in the increasing length of the dales as compared with the duration of the peaks. There is no evidence that the absolute height of the peaks is lessened; that is, that the degree of attention at its best moments is decreased; until the moment of actual sleep arrives. From analogy with certain toxic conditions, we may be reasonably certain that the peaks do reach normal height in spite of these lessened frequencies and durations. This applies, however, to normal sleep only, and not to all sleep-like conditions, nor necessarily to hypnotic sleep.

The second characteristic diminution of attention is a reduction of its *range*. The sleepy person can no longer "distribute" his attention over so many different series of events. If he has several concurrent series to watch, as in driving an automobile, he must neglect some while attending to others. In both of these respects the effects of sleepiness are very similar to those of alcoholization, and of insufficient oxygenation, in which conditions we have found that attention phenomena may be very usefully studied.[3]

Another important psychological symptom of sleepiness is an interruption of the normal process of association, both of "association of ideas," and of association in complex series of movements. Certain well mechanized associations may function almost perfectly.

[3] Important results on this point were obtained by the author in research in the Air Service, but have not yet been fully reported.

A violinist may play his part in an orchestra very well, when so sleepy (or so drunk), that he has a very confused notion of what is going on: provided, of course, the composition is very familiar, and played as he is accustomed to play it. Likewise, the associative recall of ideas is modified. Thoroughly mechanized associations may function: the ringing of the bell arouses the idea of dinner, and the "good night" of some one gives a clear idea that some one is taking leave. But the finer control is absent, and simple and erratic, rather than multiple, associations are aroused. Thus, the sleepy person tends either to agree with everything said to him or to resent and reject everything, rather than to have associated supporting and opposing ideas both aroused. This, again, is strikingly like mild alcoholism, and is the basic condition of hypnosis, which exhibits many of the psychological peculiarities of normal sleep, but in varying and partial combinations.

A third psychological characteristic of sleepiness is the abolition of the learning process. Momentary impressions may be made, and series of perceptions produced. Series of reactions may be gone through nearly as well as they would be, at an equivalent stage of practice, when fully wakeful: but they do not "stick": there is no improvement, and the material is not retained, the acts not made habitual.

These three manifestations of sleepiness become more marked as the condition of actual sleep is approached, and it is not unreasonable to conclude that the essential conditions on which they depend become still more marked in sleep itself. In fact, it is possible to show that these three are but phases of a single condition, which accounts for many of the phenomena of sleep, and which may most easily be related to the general theory of the "conscious" activity of the nervous system in which I have been especially interested: a theory which is, strictly speaking, not "physiological" at all, since it makes no assumption as to the nature of neural processes; but which merely summarizes the known psychological facts of habit formation on the scheme of a simple assumption in regard to the general mechanism of the nervous system to which, so far as I am able to determine, every neurologist agrees.[3]

This theory embodies four points: (1) that stimulation of receptors normally results in afferent "neural current" which reaches

[3] For fuller details on the theory of conscious reactions, see the third part of the author's *Mysticism, Freudianism and Scientific Psychology* (Mosby, 1921), and the article on "The Biological Basis of the Association of Ideas," *Psychobiology*, Vol. II, No. 1, February, 1920.

the spinal cord or brain stem, may be shunted through the hemisphere or cerebellum, and finally results in efferent current directed to muscles and glands. (2) that there are, in the cord, brain-stem and brain, multiple synaptic connections of such nature that the "nerve current" entering over a given afferent route may be shunted on to any of a large number of efferent routes, and conversely, that "current" entering over any one of a large number of afferent routes may emerge over a given efferent route. (3) that the central nervous system works *integratively:* that instead of a number of afferent-efferent routes or *reaction-arcs*, functioning independently, the various reaction-arcs tend to become functionally connected, so that not only the simultaneously existing discharges, but even those occurring in succession, tend to form an integrated system. (4) that, therefore, we are not, in general, dealing with an isolated stimulus producing a reaction of an isolated muscle group, but with the total mass of stimuli as affecting the action-mechanism of the body generally, although in any given total reaction, a limited group of stimuli and the action of a limited group of muscle and gland elements may predominate.

These assumptions are inevitable, and furnish the full basis for the understanding of the process of habit formation, in which processes such as the formation of a new principal route of discharge, as exemplified in the so-called "conditioned reflex," are mere details.

Moreover, we should expect to find, as the integration falls apart, that certain parts of the system might continue to function with fair efficiency, as small systems, just as we do find the "vegetative" functions and certain mechanized reaction processes going on: and we are not surprised that these should show occasional "spurts" of high activity.

Sensory stimulation will not, in general, during sleep, produce its customary reactions, and hence not its customary consciousness. But detached effects are produced, and sometimes, if the stimulation is sufficiently intense, integrative results somewhat resembling the normal will be momentarily produced. Moreover, random, detached ideational processes must occur; for ideational process must inevitably be found to be a reaction process, just as is perceptual process. In short, on the basis established, without referring to experience at all, we could predict that *dreams* must be possible. It could be predicted that these dreams would vary all the way from the lowest degree of vividness (degree of attention), and the lowest degree of inconsequentiality, to a vividness and connectedness resembling the most attentive

and coherent waking thought processes and perceptions. In fact, odd as the statement may seem, if we had not this firm basis in sound theory, we would have real difficulty in establishing that dreams actually occur! For, it might be urged that all so-called dreams are really constructed in the first process of recalling them, since it is a demonstrable fact that a great deal of what we report as having been dreamt *is* constructed in the recalling. But we have the evidence for the reality of dreams in these facts: first, that on our empirically derived theory, dreaming is obviously possible; second, that the physiological functioning of sleepers is affected in the way it should be if, in accordance with the theory, dreams occurred; and third, that it has been experimentally shown that stimuli applied to sleepers produces on their alleged dreams precisely the effects it should produce on real dreams.

That dreams are often elaborated in the recalling is indicated by the fact that successive tellings of a dream at intervals of several hours, if the dreamer is unsuspecting, show progressive elaboration, in spite of the fact that the first telling should pretty well fix the story. Moreover, in the cases of stimuli which are worked into dreams (sounds, light, etc.), the inversions of order, often resulting in putting a considerable part of the dream before the stimulus, are too frequent to permit us to assume that the stimulus "just happened" to fit into a dream already in progress. Again; the cases, reported at least in good faith, in which a dream requiring many minutes for its telling, or even for its thinking through, is dreamed in a few moments, can be explained in no other way than that a few detached dream ideas have, in the "recalling" of them, been woven into a connected story by supplying material, through normal association processes, adequate to connect and interpret the fragments.

The proposal of the theory that two or three dreams may occur simultaneously, is without doubt due to the fact that in cases where a great many fragmentary ideas have occurred, it is easier, in recalling them, to organize them into several narrations than into one. By separating the fragments into two or more groups, less additional material for making them into connected narratives is also required.

Manifestly, the conditions for accurate memory of what is really dreamed are poorly supplied. Accurate memory for waking events requires a high degree of integration — a high degree of attention — at the moment when the original experiences occur. But the situation in dreaming is in general just the reverse. There is low attention,

low integration. Hence there is the greatest chance for complete forgetting of the dream, on the one hand; and for inaccurate, constructive recalling, where a few of the ideas are remembered. In some cases, the vividness and coherence of the dream ideas is high, approaching the conditions of the waking state. In such cases, the accuracy of recall is undoubtedly greater, and doubtless some detailed and coherent dreams were really dreamed in approximately the form as related.

The causes of particular dreams are difficult to trace. Without question, the laws of the association of ideas — that is, of habit formation — apply in cases of low integration as in high. Freud and his disciples have made much of their "discovery" that dreams, as well as mental processes in "every-day life" are causally determined: are not matters of chance or of the interference of supernatural powers. Since all psychologists for at least the last hundred years, if not for the last two thousand years, have assumed this, the "discovery" does not seem epoch-making. The discovery of the particular cause is another matter, and in regard to these, psychology and psychoanalysis differ sharply.

It has long been known — in fact, Aristotle remarked upon it — that in the decreased integration of sleep, the perceptual reactions originating in the visceral and somatic receptors suffer less reduction than do those of the "special senses." We should expect, then, to find organic conditions very influential in the determination of dreams: and so they are: and so they have been admitted to be by a long line of dream investigators. Furthermore, if we should accept, even in part, the "James-Lange" theory of the emotions, we should expect to find an important emotional factor in the production of dreams, the emotional processes present in sleep having large sway in the determination of such associative processes as occur in the lowered integration of the nervous system. The facts again quite fit the expectation.

Now we come to the question as to the relation of consciousness (awareness) to this sort of neural activity, and we find that as a matter of fact, consciousness occurs only with these reactions; or perhaps, also with reactions which have become abortive. Since, moreover, no one has been able to discover any differences in function of the individual nerve cells, except in so far as receptor cells[4] are specialized

[4] Formerly, the results of operative work on "sensory centers" were interpreted as showing a special function of cells in these "centers." It is now seen that such operations completely interrupted the discharge pathways from the sense organ to the effector system, and are equivalent therefore to severing all the afferent nerve fibers from that organ.

to respond to specific physical stimuli; and in so far as certain motor ganglion cells may perhaps be able to discharge periodically without external stimulation; it is necessary to conclude that the specific condition of consciousness is *integrative action* of the nervous system.

This final assumption, unlike the fourfold one before stated, may not be generally accepted; but I can see no alternative, and until an alternative is proposed, it has right of way.

We have now all the "theoretical" material needed: and in terms of "theories" of an iron-clad sort. Since there is demonstrably a series of degrees of integration, we should expect to find degrees of consciousness: and we do: and we conventionally call them degrees of attention. We should expect then, to find, when the integration of the nervous system falls to pieces, as it manifestly does during sleep, disturbances of attention of precisely the kind which we have described above, the beginnings of which are characteristic of the approach of sleep, or of need for sleep. We should expect to find the higher degrees of integration more and more separated by "slumps"; and we should expect to find the synthesis of several afferent processes into a total efferent process becoming increasingly difficult.

Learning, or habit formation, is essentially a process of integration or organization of reactions. This is true of all forms of learning, including the association of ideas, for ideas are, after all, forms of reactions. The lessening of the general integration tendency involves also the reduction in the specific form through which new reaction patterns are established as habits, for the experiment of Pavloff shows clearly that formation of new reaction patterns is due to the fundamental tendency of reaction-arcs simultaneously functioning to establish connections or "drainage" between them. The reduced learning capacity of drowsiness is clearly an aspect of reduced integration function.

Among the emotions determining dreams, *desire* has long been known to be important. On this point, psychoanalysis has told us nothing new. But that desire is the only determining emotion, as the psychoanalysts seem to think, is not a fact. Every emotion which is carried over into sleep, or which is aroused during sleep, as its mechanism comes into play, has its effect. Far from emphasizing the causal nature of the dream process, Freud, more than the psychologists, seems to have minimized it by assuming that a multitude of mental processes are without causal effect, and ascribing causal relation to a limited group. Of course, the dream-producing effect of different

emotions is different, and Freud may have meant no more than this trite fact. In general, the anticipatory emotions — desire, aversion, fear, dread, hope, anticipation (which may involve neither fear nor hope) and worry, with their tribes of variants, are the more efficacious emotions so far as dream production is concerned. We might make a shrewd guess at the reason for this, but prefer for the moment to let it go as an empirical fact. Perhaps the psychoanalysts will say that these emotions are all "desires": if so, the case would illustrate very well the rule that when the novelties of the "newer psychology" are boiled down to sober fact in accurate terminology, there is nothing left but familiar "old" psychology.

Although the anticipatory emotions are the more influential, other emotions are demonstrably effective. A painful or pleasurable experience of the day, in the memory of which no anticipation or wish is involved, may either recur in a dream: or the emotion, recurring, may bring some other experience from the past, through association with the same emotion. In analysis of such cases, we must frankly admit the difficulty of determining the actual associations, and attempt above all to identify the real emotion, and the cause for its occurrence. The ideational factor connected with it in the dream may be one associated with it at some earlier time, and not the idea associated with it at the time which determines its occurrence during sleep.

In the low integration of sleep, a given perception, or a given idea, will not in general arouse in memory the associated idea which it would be most likely to arouse in waking life.[5] The same laws apply in sleep as in waking, but the conditions of associative recall are always exceedingly complex, and any change in the condition must change the result, unless precisely balanced changes happen to occur. To assume that ideas are associated with each other, and with emotional factors, in simple one-to-one ways, is to miss entirely the facts of association. Undoubtedly, in cases where dreams are directed by stimulation of

[5] In discussing the association of ideas and the "arousal" of ideas, we must bear in mind that there is no evidence for an idea as a *thing*, which passes out of the "mind," and exists in some filing system of an "unconscious mind" until brought back into the "mind." An idea is an act of awareness; the repetition of the idea, however "aroused," is the repetition of the act, just as the repetition of a word is the repetition of an act. The idea (which in fact is a word in many cases) has no more existence during its "absence from consciousness" than has any word in the intervals between its being spoken. *Retention* for ideas, as for any acts, consists in a modification of the nervous system, through the integrative tendency, such that the proper stimulus will at some future time cause the same reaction. Serial association, by which one idea acquires the capacity to arouse another idea, is one case of the general association of reactions, in which the completion of one act is the stimulus for the initiation of a second act.

the external senses, as in the universal dream of nakedness, which in most cases is so clearly due to dermal chilliness, the direction is in large part through the unpleasant emotion directly aroused by the chilliness. In such circumstances, the dreamer seldom if ever dreams of pleasant situations, although if the dream were really a "fulfillment" of a "repressed" sexual wish, as the Freudians ingeniously suppose, we should expect the fulfillment to be most frequently pleasant.

The importance of the emotional factors in dreams is strongly emphasized by the universal dreams, such as that of being nude. The dream of flying: of moving through the air by merely "flapping" the arms, or by some other absurd means, is apparently due to respiratory feelings. The dream of falling, always colored by a strong emotional feeling, may perhaps be due (this is a tentative explanation), to spasmodic contraction of a certain group of genito-urinary muscles: a contraction which uniformly occurs in actual falling, or even in the sudden thought of falling, as when one comes unexpectedly on an open elevator shaft, or the perception of some one else falling. In any event, the emotion aroused is the important thing, and suggests the ideational factors of the dream.

There is one special type of associative revival in dreams, which, when considered by itself, out of relation to the more general facts of association and recall, has seemed a marvelous phenomenon to those unacquainted with the psychology of the thought processes. This is the case in which the thing dreamed of is a *symbol* for something else. Now, a symbol is something which has become definitely associated with anything else, as, for example, the name of a man with his appearance or personality. The most conspicuous symbols, however, are those which have become associated with systems of objects, with classes or genera, or with abstract principles. Thus, the flag is the symbol of the nation, associated in common thought with not only the name, but many other characteristics of a people: the six-pointed star is a symbol of "perfection": and the rose is the symbol of silence or secrecy. The history of religion, and consequently of art, is full of symbols, developed in part as an efficient means of calling attention to certain facts of life and certain articles of faith, and in part as a means of secret communication between members of a select group. Much of this symbolism is unknown to the average man, but every one has a vast range of associations of a similar nature. To one man, his collection of golf clubs is a symbol of recreation. To another a

certain journal is a symbol of anarchy and deadly civic danger, and so on. In other words, these particular objects have become associated with a certain condition of things, or with certain principles, so that the thought of the one associate leads by normal progress to the thought of another.

As a matter of fact, any pair of associated terms stand in exactly the same psychological relation to each other as symbol and thing symbolized, and it is impossible to draw a line sharply around a group to be exclusively designated as "symbols."

The occurrence of symbols in associative thinking is therefore not a source of especial difficulty for explanation, but merely a typical case of the general process. It is intelligible that a man who feels in need of recreation should think of a certain new golf club he has not yet tried out: the club is for him the symbol of recreation, associated definitely with the whole situation. Nor is there anything more surprising in the fact (to cite an actual case) that a young woman who has been facing serious temptation, and has been emotionally excited about the situation during the day, should dream of an anchor, the symbol of her religious training, consciously associated through hymns, sermons, and miscellaneous religious training, with a force sustaining her against temptation. In the same way, in dreams due to worry over a situation involving a definite individual, another individual associated with the first — through similarity of names or any other common associative link — may appear as the "symbol" of the first.

In normal waking thinking, the calling up of one association by another, whether ideational or emotional, is determined not by the single association alone, but by the conjunction of many associative links. The term first appearing is usually linked to a number of others, any one of which might next appear. But other ideas and perceptual processes, just preceding, are integrated with the idea or emotion of the moment, and co-operatively determine the exact direction of associative recall. In the fragmentary integration of dreams these normal controls are absent, or interrupted, and the associative recall accordingly takes directions which, compared with the waking processes, seem irregular and freakish.

Distinctively symbolic factors occurring in dreams are in most cases certainly, perhaps in all, items which have been associated with a group of others along with definite emotional factors. The recurrence or revival of the emotional tendency in sleep may, under

the relatively uncontrolled conditions described above, bring on any of these factors, which appearing thus relatively detached, are symbols of the total situation.

One great danger in symbolic interpretation of dreams lies in the difficulty in determining what the dream details symbolize for the dreamer himself, and the tendency of the interpreter to substitute the symbolic meaning they have for him. In trying to trace an associative link from a given item, the important point is to determine the association which the dreamer has actually formed in previous experiences, and avoid the association which the interpreter has formed. Another danger, when the fact of *an* association in the dreamer's experience is established, is in too easily assuming that it is *the* association which functioned in the dream state. In most cases, an item has been associated with a considerable number of other items, and the particular association which became effective in the dream state may be replaced by another in the more fully controlled waking state.

In all cases, associations exist only where they have been consciously formed in the past: in other words, they must be *learned* before they can exist as reaction tendencies. Here, as elsewhere, we can dispense entirely with mystical notions, and rely entirely on the established principle of habit formation. Ideas themselves are acts, and not things, and the laws of their occurrence are in accordance with the general laws of organic reactions.

Simple paired associations, such that direct substitution of one term for another can be made in interpretation, and associations of a simple item with a complex system of items in such a way that any detail in the system tends to arouse the simple item: symbolic associations, in other words are more striking than frequent in dreams. One unfortunate result of fascination by the concept of symbolism, especially when it is naïvely conceived as a working of some mystical force, is the tendency to force symbolic interpretation where the situations are really more complex. The valid and thorough interpretation of dreams, aside from a few simple types, is a technique which must await the completion of a great deal of experimental research. The extent to which our present knowledge of dream phenomena depends on experiments, in spite of the fewness of these experiments, is striking, and is a strong indication that further experimentation will be really profitable. The fact that very little experimental work has been done since the publication of Mourly Vold's monograph in 1896, may be due in part to the withdrawal

of interest from experimental research in this field through the influence of Freudian theories; but it is certainly largely due to the extreme difficulty which the field offers to experimental technique, and to the great expense which would attend any comprehensive investigation. It is to be hoped that some time, some philognostic foundation will provide funds for the maintenance of a special laboratory or vivarium in which human subjects can be kept for a sufficient period of time under standardized conditions, and in which an adequate corps of psychologists and physiologists can be maintained for the extended study of sleep and dreams.

REVIEWS

HUMAN BEHAVIOR IN RELATION TO THE STUDY OF EDUCATIONAL, SOCIAL, AND ETHICAL PROBLEMS. By Stewart Paton, M. D., Lecturer in Neurobiology at Princeton and in Psychiatry at Columbia, ex-President, Eugenics Research Association, New York. Charles Scribner's Sons, 1921. Pp. v, 465. Price $6.

This comprehensive discussion of human personal and social affairs "is intended," so its author says in the Preface, "to serve as an introduction to the study of human behavior. * * * The importance of the subject is obvious and has been tragically emphasized by the present world crisis. Little is known about man as he is. Imagination has supplied many of the details in the picture of what he was once supposed to be, while the anxiety associated with the unrealized expectations of what he might have become has increased the difficulties of taking measure of his present stature. Parent, teacher, physician, student of social phenomena, prospective reformer, statesman, and philosopher, each has his special interest in the great human problem. * * * There can be little doubt that in the careful painstaking study of man as he is, will be found the means by which human institutions may be established upon a more rational basis and at least an intelligent effort made to lay the foundations of a durable peace." In thinking of the book as an "introduction" to human behavior the reader will promptly see that it introduces him to social rather than to personal psychology, which is undoubtedly the more correct way of orienting behaviorism.

Fourteen chapters and a good index constitute this work so far as practical plan is concerned, every one of them showing a very wide and detailed acquaintance with the world's work each in its own direction. The titles of the chapters are these: "The study of the individual in relation to educational and social problems; adjusting mechanisms; special mechanisms of adjustment; the personality; the development of the personality; organization and synthesis (temperament, character, and intelligence); controlling mechanisms (inhibition); factors determining the trends of activities (dispositions); habit-formation; involution of the personality; imperfect organization of activities (conflict and dissociation of the personality); methods of studying the personality; the intelligent direction of activities (education); and the study of man in relation to the progress of civilization."

Besides being, in the good sense of the term, a useful compendium of the best thoughts on this great subject, Doctor Paton's present work is marked by that wisdom that comes from extensive reading ably digested and the food-essence thus obtained then pushed a little further toward our knowledge of the truth. "Gnothi seauton!" said the wise-man of Athens; here and today we find it echoed in our introductory chapter: "The truth which will eventually make men free will be the truth revealed by patient, careful study of the human individual; and upon this revelation depend many of the hopes for the continued existence of the human race." At present "man is his own worst enemy." The present reviewer (as much of his work would show) heartily agrees with the author that in studying all available aspects of the human being the real student is doing an intensive bit of evolution, — mayhap the most intensive that he could do. The physician who does not get this point, sharp and penetrating into the very heart of scientific Truth, fails to get beneath the epidermis, as it were, of his opportunity and so he rails at the psychologist and all that this creature thinks and does, not knowing, usually, even what it is all about.

Indeed, the average physician is a sort of "Dr. Jekyll and Mr. Hyde," for when associating with his patients (usually) he is a natural idealist, but when talking shop ostensibly only a mechanism, albeit a machine his utmost imagination cannot adequately compass. To correct this lamentable and persistent state of medical affairs, this curable hemiplegia of wisdom, is one of the greatest of present problems of medical education. This book and similar works, could they be sympathetically read by the "doctors," would sometime or other force the mental aspect of life into the effective consciousness of most of them, preferably, of course, in school.

Doctor Paton's book is undoubtedly the best of its kind, and is a fine synthesis of modern knowledge enlivened and humanized with human scientific imagination from many minds besides the author's. The ever-more numerous students of Things-in-general in the ancient town of Weiss-nicht-wo can't fail to welcome it with wide open hands — wider open often than some of the impatient minds who will not appreciate its large value as a basis of further synthesis as well as a contribution to important knowledge.

GEORGE VAN NESS DEARBORN.

SLEEP WALKING AND MOON WALKING: A MEDICO-LITERARY STUDY. By Dr. J. Sadger, Vienna. Translated by Louise Brink, New York and Washington. Nervous and Mental Diseases Publishing Co., 1920. Pp. x, 140. Price $2.00.

This volume is number 31 of the Nervous and Mental Disease Monograph Series, and there are few treatises on the subject. There are a brief translator's preface; an introduction by the author; two parts, respectively "Medical" and "Literary Section"; a conclusion and résumé; and an index; the original's title is "Über Nachtwandeln und Mondsucht," and it is the seventh volume of "Schriften zur angewandten Seelenkunde," edited by Freud in 1914. Other German sources of this psychologic material are Krafft-Ebing, P. Jessen, Spitta, and Löwenfeld. The average reader of the JOURNAL will find here all of it he is apt to need in his business, and this of great interest.

Part I consists of the exposition and the analysis of five of the author's cases, and three autobiographic reports from general literature by Burdach (the famous neurologist), L. Ganghofer, and L. Tieck.

Part II, nearly two-thirds of the book, quotes from (and criticizes Freudially) Sophus Michaelis's "Aebelö," Gustav Frenssen's "Jörn Uhl," Otto Ludwig's "Maria," and "Buschnovelle," T. Mundt's "Lebensmagie, Wirklichkeit, und Traum," H. von Kleist's "Der Prinz vom Homburg," L. Anzengruber's "Das Sündkind," and from "Macbeth" by the Master-Poet across the North Sea.

As readily may be imagined, the Teuton author thinks, or would have his readers think, that Shakespeare had wished his father dead, that he was a sleep-walker, etc., in a form and a substance that well might be foretold before Sadger's opinion was read. Here he goes out of his way to be Teutonic when his previous quotations and animadversions already have adequately emphasized his thesis.

The "conclusion and résumé" of this interesting discussion is adequately represented by the following paraphrases of its eight sections, in part, however, quotations:

1. "Sleep walking under or without the influence of the moon, represents a motor outbreak of the unconscious and serves, like the dream, the fulfilment of secret, forbidden wishes, first of the present, behind which however infantile wishes regularly hide. Both prove themselves in all the cases analyzed more or less completely as of a sexual erotic nature."

2. The leading wish of the sleep-walker is to "climb" into bed with the beloved "object," as in early childhood.

3. The sleep-walker often identifies himself with the beloved by putting on her clothes, imitating her, etc.

4. Children sometimes can satisfy themselves by pretending to be asleep on sundry occasions without being blamed, and sleep-walkers in like manner strive to escape censure.

5. "All sleep-walkers exhibit a heightened muscular irritability and muscle erotic, the endogenous excitement of which can compensate for the giving up of the rest in bed," — surely a bit of esoteric Freudism that might mean something if proven real. "Muscle erotic," especially pure Freudism, is about the limit of analytic asymptotes!

6. "Sleepwalking and moon walking are in themselves as little symptoms of hysteria as of epilepsy. Yet they are found frequently in conjunction with the former."

7. "The influence of the moon in this moon-affectivity [sic] is very little known, especially in its psychic overdetermination. Yet there is little doubt that the moon's light is reminiscent of the light in the hand of a beloved parent who every night came in loving solicitude to assure himself or herself of the child's sleep." [Etc., even with gas and electricity? But why not include some mythology?]

8. "It seems possible that sleep walking and moon-walking may be permanently cured through Freud's psychoanalytic method."

All this, says Dr. Sadger, is only "the first beginning of an understanding." For it let us render all thanks that may be due. The book undoubtedly will sell. GEORGE V. N. DEARBORN.

THE BEHAVIOR OF CROWDS. By Everett Dean Martin, Lecturer in Social Philosophy and Director of the Cooper Union Forum of the People's Institute of New York. Harper and Brothers, New York, 1920. Pp. 303.

THE author of "The Behavior of Crowds" has presented us with a work replete with picturesque and interesting illustrations of crowd phenomena, and being a keen observer of people and events he has gathered together in this volume the fruit of a versatile experience as lecturer and reader.

The first chapter points out the complicated play of social forces in our civilization today, with an increasing necessity to be able to understand and interpret this flux of ideas and events. Individual materialistic psychology cannot account for the facts; and the attempts

of LeBon, McDougall, and others only partly explain social behavior. The author believes the "unconscious" is possibly a means of approach to the solution of the problems in the field of social psychology, and acknowledges the valued contributions of Freud and other analytical psychologists in giving means and methods of attacking cases in mental pathology.

The crowd is not the same as the "masses" or a gathering of people. In a certain sense it is scarcely an entity; but in another sense, as a "state of mind," it is a very real entity. In a crowd the individuals apparently think and act mainly by and through their unconscious mind; hence the crowd mind is really a form of abnormality like dreams, delusions, insanity and other forms of automatic behavior. Social gatherings serve as useful releases for "complexes," and also for the establishing of ideals and beliefs (or perhaps illusions). The abstract ideas held as beliefs by the crowd form a closed system like the obsessions of the paranoiac and hence tend to make individuals act and think like automatons.

Accepting Freud's theory of the extreme egoism of the unconscious, the author draws further proof of this fact by enumerating incidents in history and of his own experience. The individual's unconscious and the crowd mind are in about the same relation as microcosm is to macrocosm, both being characterized by extremely prejudicial, egoistic, selfish, and conservative qualities of thought and action. But the crowd as a creature of absolutism and hate is much more extreme than the individual if one can judge from some of its acts as given in this book. Taking this for granted and going but a step further, the author questions the judgments and value of crowd rule or democracy. Is it not irrational, tyrannical, and hopelessly conservative and "propagandered"? To give a final word in this matter the writer very wisely refers to other experts in that field; but he leaves the suggestion that democracy is the best mechanism of government, and that education beginning with the individual is the solution for bettering present affairs and the way to salvation from the evils of some of the present day social movements.

Following upon this brief outline of the contents of the book, a discussion and criticism of it seem obvious. Its principal weakness (if it may be termed such) lies in its dependence upon and avowed agreement with the theories of Freud. All criticisms of vagueness, mysticism, and lack of adequate proof that have been made of Freudian theories and methods are equally applicable here. The discussions

and practical illustrations from everyday life appear sound; but there is a lack of definite empirical proof to substantiate any of the more fundamental suppositions of the "unconscious," "crowd mind," etc., as used in this larger sense. Freud has achieved a goodly number of seemingly remarkable cures by his so-called reductive method, but his general theories are far from being universally accepted. A considerable number of psychologists in fact conceive that many of the results are achieved chiefly through the personality and experience of the investigator, and in spite of his theories, rather than by means of them. Lack of space prevents further discussion of this question, but it must be settled before we can seriously assume the validity of many of the assumptions in "Behavior of Crowds."

Another item in question is that of the "crowd" and its characteristic features. In the first place, this "state of mind," the essential constituent of the crowd, is an extremely vague and elusive conception. Man, the *individual*, is in himself complex enough to involve us in endless contradictions and arguments; but when a writer essays to give a unified conception of certain indeterminate groups of men entertaining uniformly certain opinions in their "unconscious," we are, to express it mildly, totally "at sea." As men differ widely both in size and behavior, so do crowds differ in number and behavior; and whether the crowd, or all crowds as the author seems to imply, are creatures of tyranny, absolutism, and hate is a mooted question.

However, in conclusion it must be said that the author has presented here a most readable and well-written book which contains many thought-provoking as well as amusing accounts garnered from the wide experience of an observant student of crowd phenomena.

H. R. DeSilva.

The Twentieth Plane: A Psychic Revelation. Reported by Albert Durrant Watson, M. D., President of the Association for Psychical Research of Canada. Jacobs & Co. Philadelphia, 1919.

At last we are told of a medium who is able to communicate with the great figures of the past, mostly literary, and to hear the opinions of their own work as well as that of their contemporaries. By use of a board, not unlike the ordinary "ouija," by automatic writing, or by speaking during trance, the medium, a Canadian, forty-two years old, well read in the works of Disraeli, Lincoln, and Ingersoll, but without an intimate acquaintance of the great poets and dramatists, is able to give messages from "Col-

eridge," "Tennyson," "Walt Whitman," "Lincoln," and a host of other famous personages. Even "Robert G. Ingersoll" when asked what surprised him most when he first found himself on the "twentieth plane" answers briefly, "That I am alive." The curious thing about all these messages or communications is that there is no marked diversity of literary style. The contrast between the style of the cynicism of "Voltaire" and that of the egotism of "Walt Whitman" is not of sufficient degree to warrant saying that the communications came from original sources, nor do "Shelley" and "Coleridge" ever break forth in lyrical meters as we believe they were wont to do. A careful study of these messages reveals the important fact that they were all, I believe, elaborations in the unconscious mind of the medium. For this reason the book is valuable and there are many resemblances between this case and that of Dr. Flournoy's Mlle. Helene Smith. There is no doubt whatever that the medium was at all times sincere and unconscious of the communications. It probably shows that by hearing, unconsciously, or perhaps reading quoted conversations and fragments of poetry and drama, the medium, as the normal conscious ego, or as an ego artistically inclined, was able to reproduce them in a form unrecognizable to himself, not unlike the original, but all unmistakably having a characteristic individual style of presentation. Nowhere, I believe, is there shown to be any direct evidence of telepathy. Dr. Watson, the reporter of the observations, postulates no theory. He says that neither he nor the medium wish to be quoted as spiritists. It is a little difficult to gather from reading the messages just what is meant by the "Twentieth Plane" for it appears that "Shakespeare," "Coleridge," and "Tennyson" frequented that plane while "Lincoln," "Disraeli," and "Emerson" are on only the sixteenth. "Sappho" on the other hand has attained the one-hundredth, while on the one-thousandth plane dwell "Christ," "Socrates," and "Plato." Ordinary mortals, "Emerson" tells us, are living on the fifth plane. The conversations are interesting and in a general way show a resemblance to the original but in no sense to be convincing.

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